OCTOBER 11, 1945

# American Machinist

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## Wrought Aluminum Alloys

# SIZE-MATIC
## GIVES YOU EXTRA OUTPUT—EVERY DAY

***Increase Internal Grinding Production when you stop manual sizing— do it automatically this Heald way!***

Every second spent in stopping to check size is *lost* production. And it adds up to plenty in a day's work. It's time that must be saved if you are going to hit a fast production pace. With a Heald Size-Matic on your job, there's no need for your operator to stop to use his hands or his head—to accurately size the work. Instead, he can devote full time to getting out *more* pieces per hour!

**IT'S AN AUTOMATIC BRAIN!**

Never mind whether you're grinding straight or tapered holes; with or without keyways; open-end or blind; large or small. With a Heald Size-Matic all your men do is to load the work and start. The Size-Matic assumes full responsibility for even the most exacting precision, by predetermining the precise number of passes required to bring the work to a desired size. And this is done without any connection with the work! What's more, only the simplest adjustments are required to make your Heald Size-Matic suitable for a wide variety of assorted jobs or large production runs. Tolerances are easily held within ten thousandths. Complete uniformity is assured.

Over 20 years of successful use have unquestionably proved the Size-Matic principle. But it's just one of the many ways in which Heald Experience can help you to get faster, better, lower-cost production — automatically. By making a date with a Heald Engineer you incur no obligation and may, very well, find out how you can beat the hands around the clock.

THE HEALD MACHINE COMPANY
WORCESTER 6, MASS.

*More Precision · Less Cost* **HEALD**

**INTERNAL AND SURFACE GRINDING MACHINES • BORE-MATIC PRECISION FINISHING MACHINE**

TECHNOLOGY DEPT.

# American Machinist

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A McGRAW-HILL PUBLICATION

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# American Machinist Chips

***In This Issue*** . . . Problems confronting government agencies in the disposal of surplus tools are reviewed and some possible solutions are suggested in an eight-page article making up the Reconversion Section. Factual data, drawn from the official records of government disposal agencies, are presented to bolster the fact that removal of machine tools from government ownership presents a gigantic task.

The lead article by Owen Lee Mitchell, Metallurgist of the Reynolds Metal Company, presents enlightening information on the characteristics of wrought aluminum alloys. The discussion serves to identify the numerous alloys and presents factors involved in selecting wrought aluminum alloys for specific products, with manufacturing processes used in its fabrication.

Use of hard laminated blocks as inexpensive benders for large quantities of small mild steel, copper and aluminum alloy tubes is outlined in an article by Andrew Brown of North American Aviation, Inc., who developed the fixtures from salvaged materials. The fixtures are made quickly, without the necessity of tool sketches in the pattern shop.

The suggestion which brought Mrs. Ina M. Skochdople the highest award made to a woman employee of the Consolidated Vultee Aircraft Corporation forms the basis of an article on how a turret lathe set-up replaced hand operations in deburring the cut-off ends of stainless steel cowl fastener bushings. The new operation is estimated to save 6,577 man-hours annually.

***Reference*** . . . We thought you might like to know that the Subcommittee on War Mobilization of the Senate Military Affairs Committee recently issued a select bibliography on "The Social Impact of Science," as prepared by the Library of Congress. It lists more than 500 titles of books, pamphlets, articles and Congressional bills and reports dealing with the social and economical problems arising from scientific progress. A special section covers the available literature on atomic power, including other volumes yet in print.

***Canned Firepower*** . . . Through the courtesy of the Army Ordnance Association, we would like to report on an item contained in one of their recent bulletins.

It has to do with a new method of packaging big guns and other weapons for long-term storage. Each piece of equipment is placed in a big steel or aluminum box which is then hermetically sealed by welding or heavy soldering. Either a dehydrating agent is enclosed to maintain permanent interior dryness or the moisture-laden air is drawn out through a simple valve after the container has been sealed and nitrogen gas is pumped in. Nitrogen, an inert gas, does not attack most materials and thus will eliminate corrosion. The cost of the canning process will be only five percent of the cost of the material, and heavy annual maintenance costs will be practically eliminated.

Here is not only a new application of metals and metal-working but also a possible idea for storage of many types of civilian machinery and other products.

Speaking of the idea of storing big guns, we quote (and second) this thought expressed in the bulletin—"It is the Ordnance's hope that these weapons will never have to be used again."

***Specials*** . . . Mr. William Fettig, Advertising Manager of Logansport Machine Co., Inc., wrote a whimsical little item for his company's publication, "Chips and Shavings." (Guess that title makes it sort of a relative of this column.) Thanks to Logansport and Mr. Fettig for the following:

## WHAT IS A SPECIAL?

### *All Departments Cooperate to Build and Ship It*

A special is a contraption that starts out with a conference lasting from one to five hours. It is finally decided that we will make it, so the available details are sent to the Engineering Department for design.

The Engineering Department, after ten drawings and thirty changes, forwards prints to production and shop. Production and Purchasing Departments take a day off to look up manufacturers where they can purchase necessary ma-

After materials are received, the shop pulls its hair out for a month or two trying to make the darn thing. Then it is finally assembled and ready for inspection. Inspection department receives same and find they require special gauges, connectors, etc., but finally in a few days, they get it hooked up. Inspected OK, it then goes to the shipping room where they cut and fit for a few hours to crate it for shipment. The truck is due to pick it up at six o'clock, and at five we receive a call from the customer cancelling the order. That is a SPECIAL!

***From the Mailbag*** . . . Here is another comment from a reader on the value of the advertising pages in *American Machinist:*

*"We wish to say that the advertising is one of the most valuable items in* American Machinist. *It is only through the use of advertisements that one can keep in touch with products which are being placed on the market, and thus build up a file of information for purchasing purposes. Often a request for a catalog or pamphlet referred to in an advertisement brings a call by the salesman of the company and, in many cases, some problem which has been bothering us for a long while is cleared up in a few minutes. This results in business for the advertising company and a satisfied customer in the manufacturer." S. L. Savage, Treas., Mead-Morrison Service Co., Inc., East Cambridge, Mass.*

## WHAT DO YOU NEED IN A CLUTCH OR COUPLING?

. . . . . PRECISION?

. . . . LOAD CAPACITY?

. . FAST PRODUCTION?

# GLEASON CURVIC* COUPLINGS give you all 3

**GLEASON CURVIC COUPLINGS** join permanently in perfect alignment the three members of a built-up crankshaft for a two-throw radial aircraft engine.

**A precision connection of a new type is now available for use in permanent couplings and releasing couplings (clutches). These couplings have teeth of radial direction and parallel depth, cut and ground into the faces of the connected parts.**

**Gleason Curvic Couplings are produced on the same Gleason cutting and grinding machines used for curved-tooth bevel gears . . . hence, they have the same high degree of accuracy and fast rate of production.**

**The Curvic design provides a precision, light, compact, and self-contained connection in which the teeth both center and drive. The accuracy and uniformity are such that complete interchangeability is possible, facilitating manufacture and assembly of the coupled parts.**

*Investigate the advantages of Gleason Curvic Couplings for your clutch and coupling applications. Write on your company letterhead for descriptive brochure.*

GLEASON Works
Builders of BEVEL GEAR MACHINERY FOR OVER EIGHTY YEARS

1000 UNIVERSITY AVENUE
ROCHESTER 3, NEW YORK

*TRADE MARK

Sharpening a large taper reamer on a CINCINNATI No. 2 Cutter and Tool Grinding Machine.

Sharpening a pencil sharpener cutter on a CINCINNATI No. 2 Cutter and Tool Grinding Machine.

# THE CINCINNATI

MILLING MACHINES

# CINCINNATI NO. 2 CUTTER GRINDER

## Puts more ~~LETTERS~~ CUTTERS in V-A-R-I-E-T-Y

If you use a variety of cutters in your shop, there's no better machine to sharpen them correctly than a CINCINNATI No. 2 Cutter and Tool Grinder. This machine has many features, and extra attachments, too, for sharpening an exceptionally wide variety of cutters. Two extremes are shown on the opposite page; a large taper reamer, and a small pencil sharpener cutter. Sensitive table traverse is essential for both jobs, while the machine must be extremely rugged to handle large reamers. Other features provide the flexibility required for sharpening face mills, slab mills, interlocking cutters, shell end mills, taps, planer and shaper tools, and others. ¶ Write for complete information on this versatile cutter and tool grinder. And if you would like a few hints on the correct sharpening of cutters, ask for bulletins M-1296 and M-1377.

CINCINNATI *No. 2 Cutter and Tool Grinder. A brief description of this machine may be found in Sweet's Catalog File. For complete specifications, write for Catalog M-962-3.*

# MILLING MACHINE CO. CINCINNATI 9, OHIO, U.S.A.

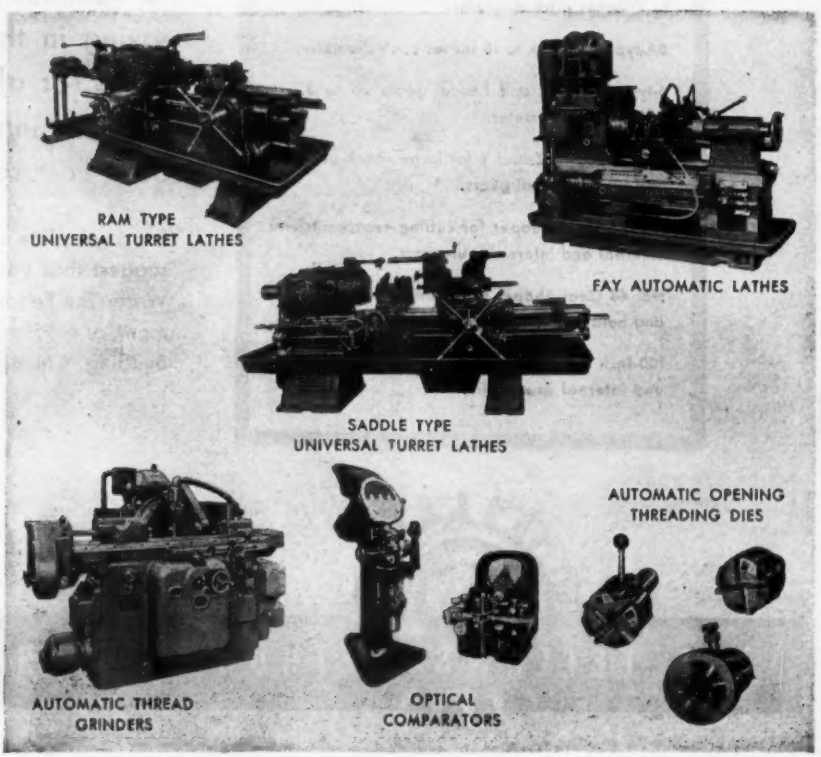
BROACHING MACHINES • CUTTER SHARPENING MACHINES

# WANTA MANAGE

# A CHAMP?

With postwar competition getting set for a slugging match, every machine you use will have to compete in the battle of costs on the basis of maximum production per man hour.

Now is the time to get rid of your "punch drunk" machines. Replace them with machines that can transmit the *horsepower and have the rigidity to take full advantage of carbide cutting tools—increase cutting speeds from 200 to 500 per cent.* Jones & Lamson has pioneered in machines designed specifically for the use of carbide cutting tools. Whether you buy War Surplus machines or new machines, send for our book "Welcome to You and Your Problem". Or, better yet, phone now for one of our engineers to assist you in making the most profitable investment.




**JONES & LAMSON**
**MACHINE COMPANY**
**SPRINGFIELD, VERMONT, U. S. A.**

Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

# Fundamental IN PRECISION GEAR CU

**1** The gear tooth-generating precision *inherent* in the Fellows Cutter when applied to work on a Fellows Gear Shaper, represents the highest possible control over accuracy.

**2** For gears on which finish-tooth-cutting is the final machining operation, the Gear Shaper pays an extra dividend in maintaining a standard of accuracy which permits truly interchangeable assemblies. *Rejects are minimized.*

**3** As a pre-shaving operation, finish cutting on the Gear Shaper holds to limits which increases the life of ultra-precise shaving tools. *Gear Shaper accuracy in pre-shaving saves much in over all-costs.*

**4** As industry returns to a close study of cost saving in the manufacture of gear mechanisms for all types of products, *the Gear Shaper's inherent precision will be found to be a cost saving asset.*

**THE FELLOWS GEAR SHAPERS LINE INCLUDES:**

7-and 7A-types for spur and helical gears up to 7 inches pitch diameter.

6A-type for work to 18 inches pitch diameter.

6-type for spur and helical gears up to 35 inches pitch diameter.

6-type Models Z and Y for large shank gears and large internal gears.

No. 30 Gear Shaper for cutting coarse-pitch external and internal spur gears.

No. 48 Gear Shaper for cutting internal spur and helical gears.

100-Inch Gear Shaper for cutting external and internal spur gears.

For a complete outline of Fellows gear cutting equipment, we suggest that you ask for a copy of "The Fellows Method". Write: The Fellows Gear Shaper Company, Springfield, Vermont, or 616 Fisher Building, Detroit, or 640 West Town Office Building, Chicago.

THE FELLOWS METHOD... MACHINES AND TOOLS FOR A

# R CUTTING...

# Fellows

● Fellows 6A-type Gear Shaper for cutting external and internal spur and helical gears. A most versatile tool for cutting gears and kindred parts.

**ALL OPERATIONS FROM BLANK TO FINISHED GEAR**

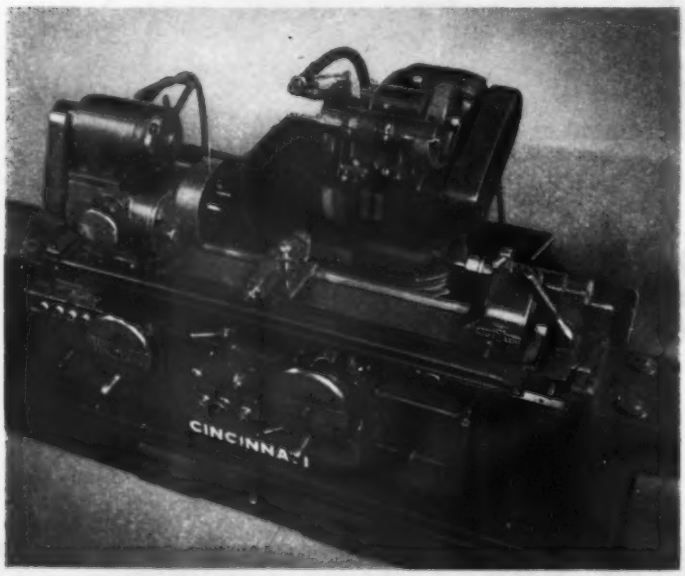
# NEW FEATURE

## OF CINCINNATI HYDRAULIC UNIVERSAL

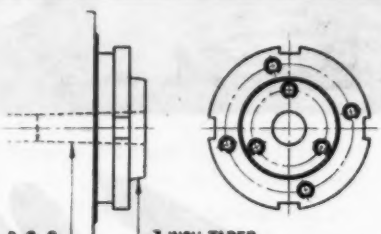
## Gives you 5 Distinct Advantages

(1) Closer accuracy on chuck and face plate work
(2) Direct mounting of standard chucks
(3) Greater rigidity
(4) "Quick Change" adapter for removing work and chuck (or face plate) as a unit
(5) Single, accessible adjustment of headstock spindle bearings

These five advantages are obtained through a new headstock spindle design and mounting . . . the front end of the spindle conforms to Lathe Standard Spindle Nose . . . the rear end has a single accessible adjustment for the precision anti-friction bearing mounting. This design is now standard on all CINCINNATI Hydraulic Universal Grinding Machines. More details will be sent on request.




**CINCINNATI** *13" Hydraulic Universal Grinding Machine. Complete specifications may be obtained by writing for Catalog G-486-3. A brief description of this machine is given in Sweet's Catalog File for Mechanical Industries.*




LATHE STANDARD SPINDLE NOSE

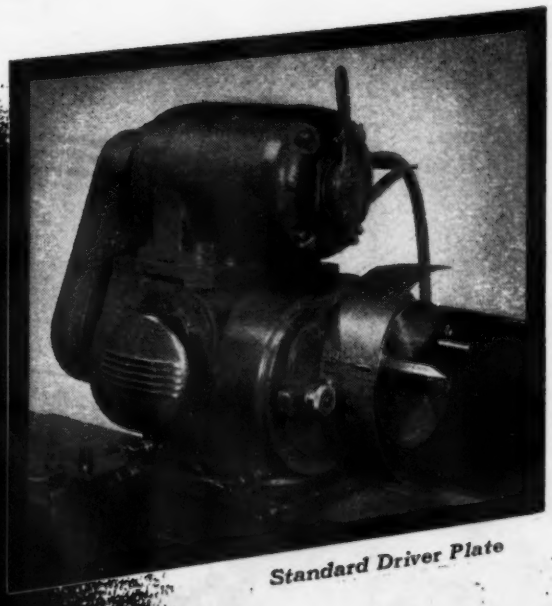
*Sketch shows details of front end of Cincinnati headstock spindle which conforms to Lathe Standard Spindle Nose . . . 5" size for the 13" Hydraulic Universal, and 6" for the 14", 16" and 18" machines.*

# CINCINNATI G

CIN

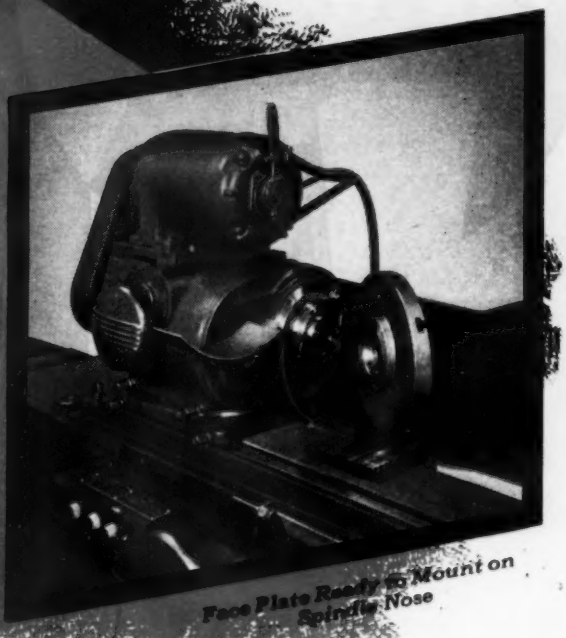
**CENTER TYPE GRINDING MACHINES** CEN

Chuck Mounted in Position



Standard Driver Plate

Quick Change Adapter



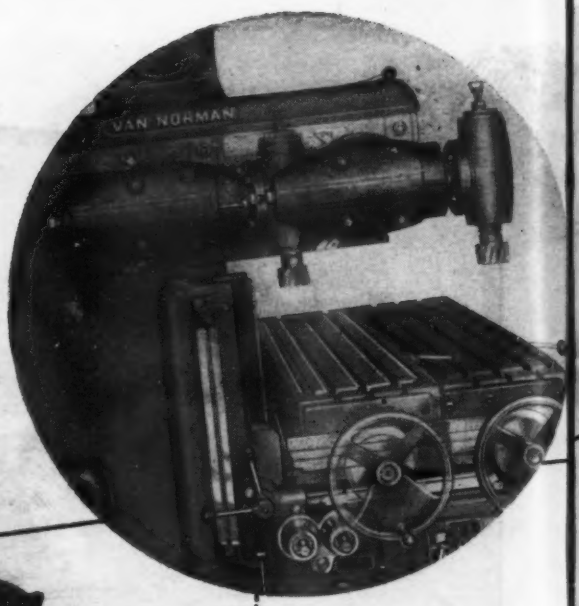
Face Plate Ready to Mount on Spindle Nose

CINCINNATI

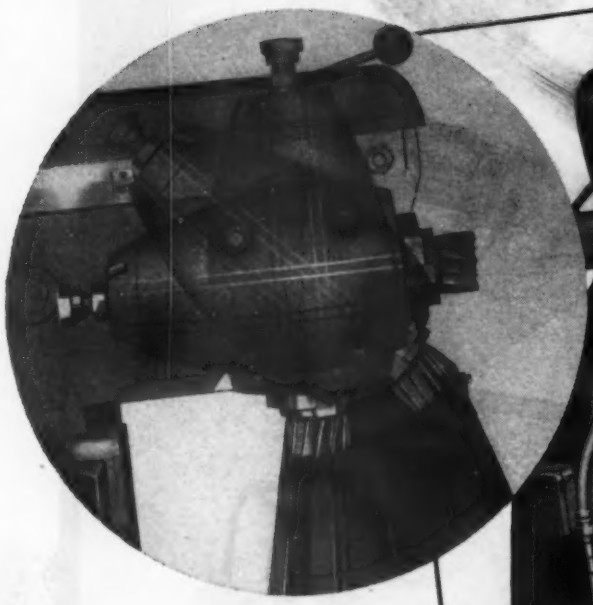
# GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES




Adjustable cutterhead and movable ram in combination with the saddle cross feed provides maximum milling capacity and versatility.



Adjustable cutterhead permits vertical . . . horizontal . . . or angular milling all on one machine — gives you the work range of several types of millers . . . greatly reduces work reset-ups.

No. 36 UNIVERSAL MILLER Table 58" x 13". 18 speeds: 30 to 1500 rpm. 18 feeds: ⅜" to 32". Range: 35" longitudinal, 12" cross, 22¼" vertical.

"It pays to Van Normanize"

Front and Rear control of both hand and power feeds gives operator complete control of milling operations from either location.

# Van Norman

## RAM-TYPE MILLERS

## Fit Today's & Tomorrow's Plans without Reconversion

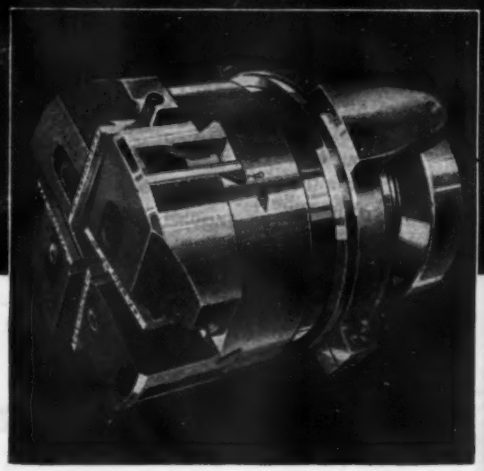
**Adjustable Cutterhead, Movable Ram and Front and Rear Operator Controls Eliminate Idle Machine Time, Reduce Worker Fatigue and Increase Production**

Are the machine tools you are buying today versatile enough to meet the uncertain, changing conditions of the future?

Van Norman Ram-Type Milling Machines will meet your present milling problems and cut your reconversion problems in post-war retooling. Why? Because these extremely adaptable millers enable you to perform horizontal, vertical and angular milling on one machine by simply positioning the adjustable cutterhead. This Van Norman feature alone increases machine production and cuts costs by eliminating idle machine time by as much as 50%. It also permits operators to carry most milling jobs through to completion without disturbing the original workpiece setup.

Here's a typical example of the versatility of the Van Norman Ram-Type Miller for tool room or general purpose milling. In any period the milling requirements may call for vertical milling . . . the operator positions the cutterhead in the vertical position, sets up the work and proceeds with the cut. The next period calls for angular or horizontal milling . . . again the operator adjusts the cutterhead and starts his work. Vertical, angular or horizontal . . . Van Norman adaptability meets changing demands with minimum of costly delays and maximum use of your milling equipment. Investigate Van Norman Ram-Type Millers. Find out for yourself how they not only meet all your present milling requirements but fit into your post-war picture. They are available in many models and sizes with plain and swiveling tables.

**VAN NORMAN COMPANY**
**Springfield 7, Mass.**



Photographs: Courtesy Sperry Gyroscope Company

Manufacturers of precision control instruments find the Landis Threading Machine and the 7/8" Lanco Hardened and Ground Head ideally suited for the threading of small vital parts on a high production basis and to close tolerance specifications.

# LANDIS MACHINE COMPANY

## WAYNESBORO · PENNA · U·S·A

# Proven in War for Peace

## LANDIS THREADING EQUIPMENT...

for { EASE OF OPERATION
GREATER PRODUCTION
FINER ACCURACY
LOW MAINTENANCE COST

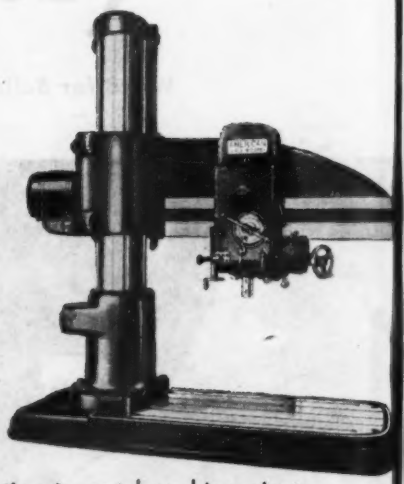
*Write for Bulletin F-80, covering Hardened and Ground Heads*

LANDIS

# "As old as Methuselah"

## BUT STILL ON THE JOB!

This War Department Photograph shows this 30-year-old "American" Radial still on active duty somewhere in Italy reconditioning the machines of war.



Doubtless it is expedient to press usuable machines into service during the present emergency in spite of their age but such practice should be abandoned the instant that the emergency has passed. It is just too costly a practice for post-war economy.

Unfortunately there are entirely too many machines of this vintage still in operation in metal working plants right here in our own country. They will have to be replaced with modern equipment just as quickly as possible if the low cost demands of the future are to be met.

Now compare the new 1945 model with its 30-year-old prototype and you will immediately see why these older models cannot be profitably used today.

| | No. of Spindle Speeds | Top Spindle Speed | No. of Feeds | H. P. Motor Used for Driving | Weight |
|---|---|---|---|---|---|
| 1945 Model..... | 32 | 2000 r.p.m. | 16 | 15 | 13,000 lbs. |
| 1914 Model..... | 12 | 500 r.p.m. | 4 | 5 | 7,000 lbs. |

Modernize with "American"—the "newest new radial"

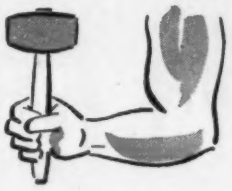
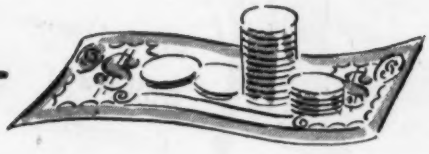
"American" Radials are low cost producers. They are modern; they are powerful; they have the stamina to insure unfaltering operation.

***Send for descriptive literature***

**THE AMERICAN TOOL WORKS CO.**

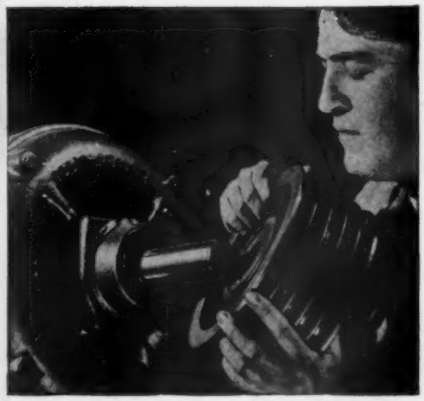
**Cincinnati, Ohio, U. S. A.**

*Lathes and Radial Drills*

# Trade this  for this ; save and 

No more *forcing* of sheaves. Simple wrench operates Allis-Chalmers' "Magic-Grip" — ***fastest mounting and demounting sheave on the market.*** Saves time, money.

**SEE HOW QUICKLY, EASILY THIS NEW SHEAVE MOUNTS AND DEMOUNTS**



**1 Place sheave on shaft.** Slides on smoothly because clearance is provided by expanded bushing. There's *no* hammering — *no* forcing! Complete sheave and bushing unit comes intact—ready for quick, easy mounting.

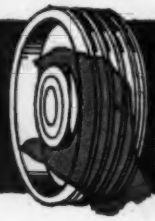
**2 Align exactly,** using straightedge, (It's easy with this free-sliding sheave.) Then tighten three cap-screws; sheave is locked to shaft, *grips like magic!* No set screws to damage the shaft. Write A-C for Bulletin B6310.

## RECONVERTING?

### *GET THIS NEW FREE KIT!*

To help you find out how your present equipment will fit into future production, A-C offers a new free "Reconversion Inventory Kit" — Fact Sheets and Check Lists to speed your appraisal of V-belt drives, electric motors, and centrifugal pumps. Applies to all makes. Call your A-C distributor or district office, or write Dept. 00, ALLIS-CHALMERS MFG., Milwaukee 1, Wisconsin.

A 1855

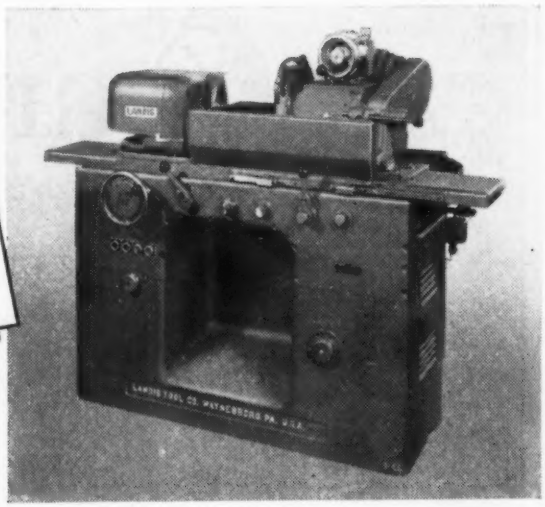
## Allis-Chalmers Texrope "MAGIC-GRIP"  SHEAVES

# A LANDIS TOOL Grinder

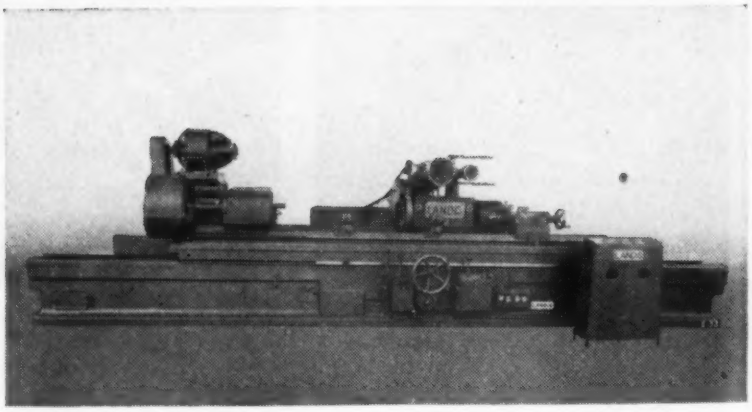
Plain Hydraulic
Ball Race
Centerless
Tool Room
Roll
Hydraulic Universal
Centerless Thread

**PLAIN HYDRAULIC 6″ CH.** For mass production of small parts such as bearings, small motor armatures, shafts and other parts of similar nature.

**PLAIN HYDRAULIC 16″ Type B.** For grinding heavy work requiring a plain machine with 16″ swing for lengths from 96″ to 192″. Printing cylinders, large lathe spindles, car axles, large shafts.



**HYDRAULIC UNIVERSAL 10″x20″ Type H.** Flexible operation and close accuracy. Universal features—swivelling headstock and grinding wheelbase.



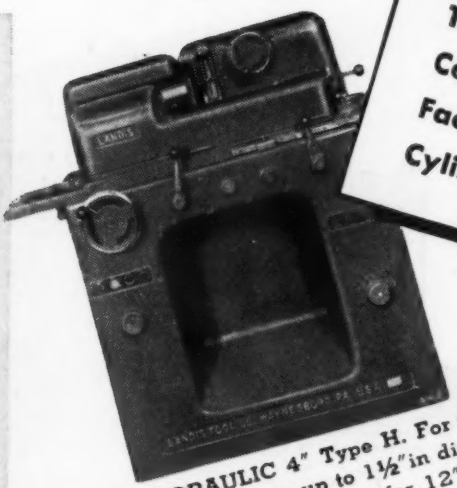
# LANDIS TOOL
## Precision Grinders

LANDIS TOOL CO.

# for Every Grinding Job

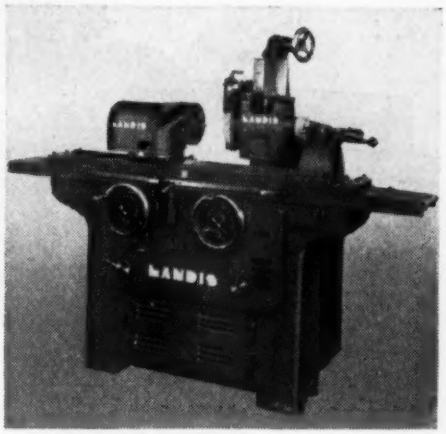
- Between Centers
- Centerless
- Taper
- Shoulder
- Tool Sharpening
- Centerless Thread
- Face
- Cylindrical

**CENTERLESS GRINDER.** For large production through-feed grinding of cylindrical work and plunge grinding of tapers to extremely fine finishes.



**PLAIN HYDRAULIC 4″ Type H.** For rapid accurate grinding of small parts up to 1½″ in diameter in large or small quantities. Available for 12″ and 18″ work length.

The grinders illustrated are representative of more than 150 sizes and types of Landis Tool grinding machines. Whatever your grinding problem, Landis Tool engineers can help you solve it quickly and at lowest cost. The machines illustrated are typical of standard machines that are available. If your problem requires a specially engineered grinding solution, Landis Tool engineers are prepared to assist with modifications of a standard machine. Call on your local representative or write us direct.




**UNIVERSAL and TOOL 12″ x 28″.** Flexible operation with swivelling headstock and wheelbase. For every grinding operation—cylindrical, internal, taper, surface, form tool and tool sharpening.



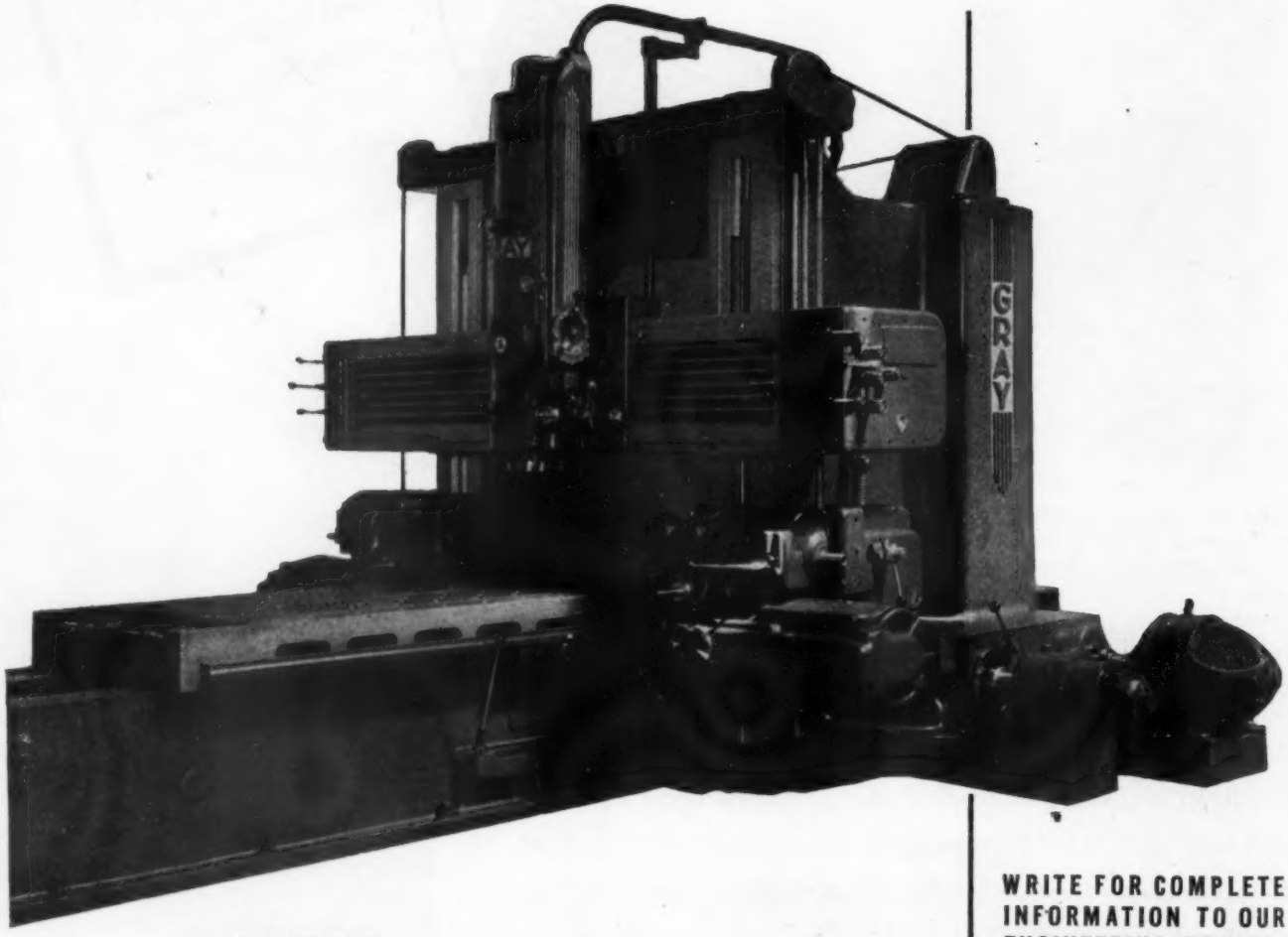
**LANDIS TOOL Company**

**WAYNESBORO, PA.**

# GRAY UNIT HEAD

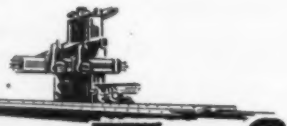
## assures speedier production

**The spindle motor is an integral part of the head. This unit construction eliminates objectionable splined power shafts, and assures a smooth even flow of power to the cutter, and enables each head to be run at its most productive speed.**



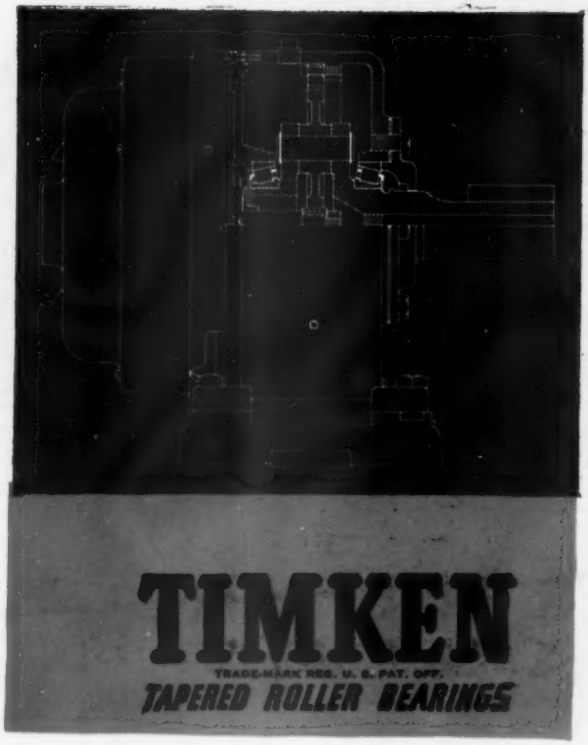

**WRITE FOR COMPLETE INFORMATION TO OUR ENGINEERING DEPARTMENT.**

DOUBLE HOUSING and OPENSIDE PLANERS
•
SWITCH PLANERS
•
DIE BLOCK PLANERS
•
MILLING PLANERS
•
PLANER TYPE MILLING MACHINES
•
HORIZONTAL BORING MACHINES



The G.A. GRAY Co.

CINCINNATI 7, OHIO, U.S.A.




These compact motor-reducer units are unique in that the speed reduction is effected by planetary gears.

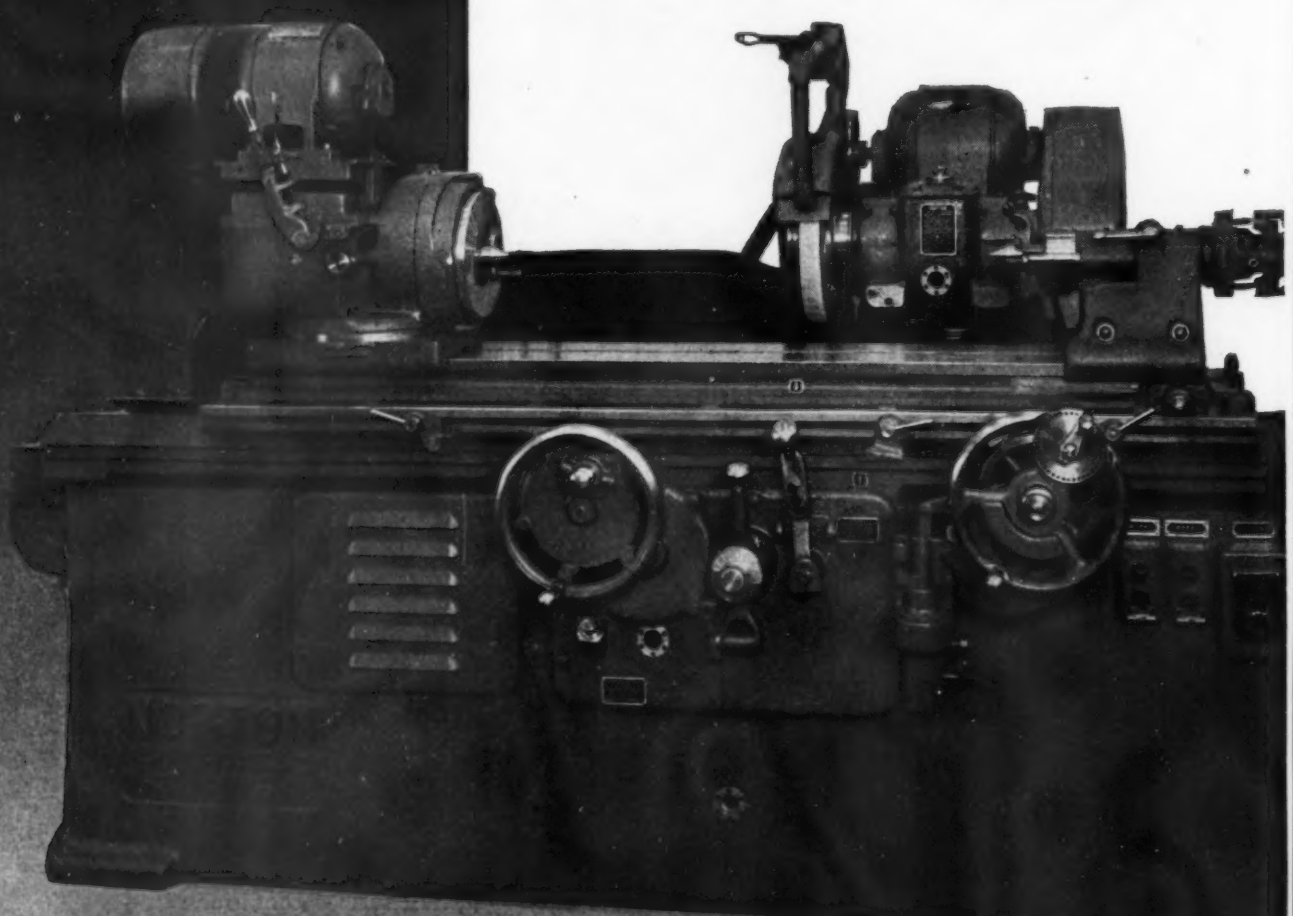
A reduction of 10 to 1 is obtained, the low speed shaft operating at approximately 175 R.P.M. This shaft is mounted in two large Timken Tapered Roller Bearings which prevent power loss by eliminating friction; carry radial, thrust and combined loads with ample reserve capacity; hold the shaft in precise and permanent alignment; and greatly simplify lubrication.

The units are made in eight sizes providing a power range of from ½ H.P. to 10 H.P. inclusive. The manufacturer, Jensen Brothers Mfg. Company, Coffeyville, Kansas, is widely known as a producer of heavy-duty oil field equipment, has had years of experience with Timken Bearings and knows they can be depended upon to do an outstanding job under all service conditions.

It pays to use Timken Bearings in any kind of machinery —but be sure the trade-mark "TIMKEN" is stamped on every bearing that goes in your product. The Timken Roller Bearing Company, Canton 6, Ohio.

# *The* VERSATILE Norton Multipurpose

**A thoroughly modern hydraulic universal grinding machine for Precision Tool Room Grinding or Miscellaneous Manufacturing Production.**

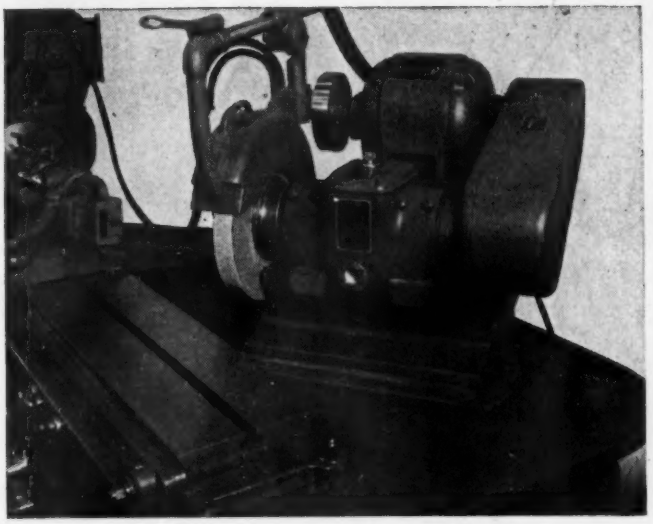


THREE SWINGS–12", 14" AND 16"
THREE LENGTHS–36" 48" AND 72"

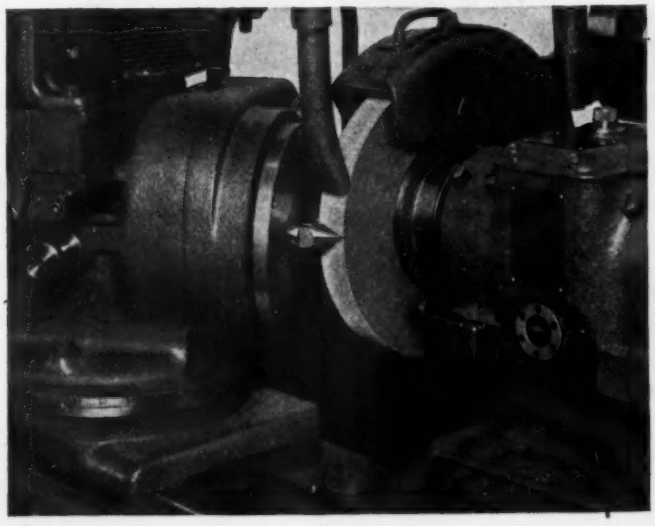
A GRINDER for miscellaneous, small lot general production or tool room work. Its standard equipment provides a versatility to handle a diversity of work with ease of set up and a minimum of time. The standard equipment adapts the machine for external cylindrical, internal and face grinding operations as well as for cutter sharpening, angular slide and other diverse applications.

Its weight and rigidity assure accuracy and fine finish on all classes of operations.

Catalog 1668 gives full information and specifications of the Norton Multipurpose Grinder. Write for a copy.



Both the grinding wheel head and the headstock can be swiveled through the entire 360° thus facilitating regular set-ups and making it possible to handle many unusual grinding jobs.



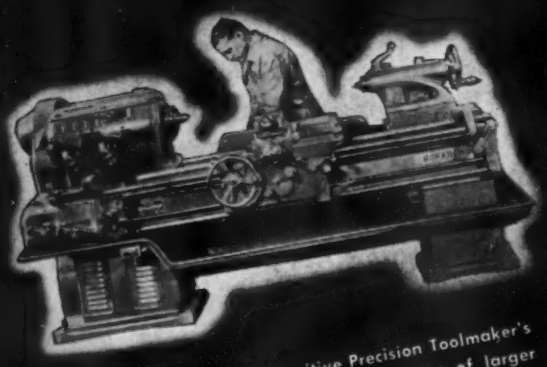
**NORTON COMPANY**
**WORCESTER 6, MASS.**

M510

**NORTON GRINDERS** *and Lappers*

# You can't do

New Monarch 10" Sensitive Precision Toolmaker's Lathe has been refined and improved to still greater accuracy and ease of control, even beyond the prewar model. Flame-hardened and ground bedways assure long-time, high-quality performance.



In addition to the 10" Sensitive Precision Toolmaker's Lathe, Monarch provides a complete line of larger toolroom machines, from 12" to 20". These are an entirely separate line from similar sizes of heavy-duty production turning machines, but include the well-known Monarch features for faster, more accurate machining.

Improved Monarch Magna-Matic, fully automatic, all-electric turning machine, incorporates latest developments in electrical controls. One button control of automatic cycle. Equipped with 6 to 1-spindle slow-down for use with rear carriage, and with automatic feed changes.

New Monarch 10" Precision Manufacturing Machine for fast, extremely accurate production of small parts. Spindle speeds up to 4,000 rpm or higher when needed. 6 to 1 back gear for increasing spindle speed range or for developing power for heavier cuts. Bench precision accuracy for mass production.

# *postwar turning...*

## WITH PREWAR MACHINES

Surveys by the publishers of "American Machinist" show that 53% of industry's production and toolroom lathes are more than 10 years old. These out-of-date machines are expensive luxuries. They are not fit to turn at lowest cost the fine, accurate work which modern machines will do. Their owners cannot hope to compete, in costs or quality, with plants that use modern, high speed, accurate turning machines.

If you are using any of these 74,000 old lathes, we suggest that you look into the timesaving, cost-saving qualities of the improved Monarch line. The most recent advances, gained through the illuminating experience of war production, have been incorporated into these highly refined and improved turning machines.

They meet the expressed requirements of alert plant operators for such things as rigidity, hardened and ground bedways, adaptability to carbide turning tools and the most convenient and accessible controls. They constitute the most complete and extensive line of automatic or semiautomatic turning machines.

Installation of Monarchs will save you time and cost in conversion to peacetime production. Their economies, combined with high-quality, accurate finishing will help you to meet some of your unavoidable postwar cost increases. You'll get more and better production per man-hour and per machine hour with *modern* Monarch turning machines.

If your reconversion needs cannot be met by our present deliveries, we'll gladly try to assist you in the selection of Monarchs from government surplus stocks. Ask our nearest office for details, and for help in putting Monarch machines to work for you.

**THE MONARCH MACHINE TOOL COMPANY • SIDNEY, OHIO**

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CLEVELAND 6, OHIO
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10465 Carnegie Avenue
Phone: Garfield 2590

DETROIT 2, MICHIGAN
801 Fisher Building
Phone: Trinity 1-0426

INDIANAPOLIS, INDIANA
Maco Building
38 and College Avenue
Phone: Wabash 2650

NEWARK 2, NEW JERSEY
635 Industrial Office Bldg.
Phone: Mitchell 2-1770

PITTSBURGH 22, PENNSYLVANIA
512 Empire Building
Liberty Ave. and Stanwix St.
Phone: Atlantic 6428

*Representatives in Principal Cities*

ACCURACY · ECONOMY · LONG LIFE

*Monarch* TURNING MACHINES

# You can see errors instantly with THESE INSPECTION TOOLS

## *The* GAERTNER TOOLMAKERS MICROSCOPE

You can't miss errors magnified 30 times. Any gage, tap, template, hob, etc., etc., when checked in the Toolmakers Microscope will instantly show any deviation from correct contour or dimension at any point. You can check all thread measurements, angle measurements, types of work otherwise difficult to check, flat or round, and readily duplicate measurements within 1/10,000".

*A laboratory instrument? Yes—but sturdily built for general daily manufacturing use. Write for details and quotation.

## *The* WILDER PROJECTOR

Throws a magnified shadow image of the part under inspection against an enlarged drawing of part. Magnifications available, 10x to 100x. Horizontal work table for flat work. Center support and micrometer cross slides for checking forming tools, screw threads, hobs, etc.

The Wilder Projector eliminates all errors due to measurement by "feel". May be speedily operated, with little or no experience. Prevents costly mistakes and insures initial correctness from the start of a production run. Price within means of all shops. Write for data and quotation.

**WHEN IN NEW YORK, VISIT THE SCHERR DEMONSTRATION CENTER. See and inspect new tools that enable highest accuracy standards at new low costs, and are setting new pace in manufacturing everywhere.**

**GEO. SCHERR CO., Inc.** 201 LAFAYETTE STREET NEW YORK 12, N. Y.

# THE TOOL YOU WANT . . .

# Instantly

*Continental* **CUTTING TOOLS**

- Boring Bars and Tools
- Broaches
- Broach Pullers
- Broaching Fixtures
- Core Drills
- Counterbores and Countersinks
- CTW Drive Holders
- Counterbores (Tool Room Sets)
- Counterbore Pilots
- Inserted Blade Cutters
- Carbide Tipped Cutters
- Form Relieved Cutters
- Milling Cutters
- Thread Milling Cutters
- End Mills
- Side Mills
- High Speed Steel Reamers
- Carbide Tipped Reamers
- Shell Reamers
- Inverted Spotfacers
- High Speed Steel Tool Bits
- Carbide Tipped Tool Bits
- Circular Form Tools
- Cut-off Tools
- Flat Form Tools
- Dovetail Form Tools

CTW

## With Continental Indestructible Drive

CONTINENTAL counterbores, countersinks, core drills (with interchangeable tips) and back spot facers—all with the indestructible Continental drive—have successfully met the exacting requirements of industry for many years . . . Holders are available for both Continental hand detachable and tapered drives, in standard and hand adjustable types and with floating drives . . . Prompt delivery can be made of standard items and special tools to your plant. Available in high speed steel and carbide tipped. Write for Bulletin 11081.

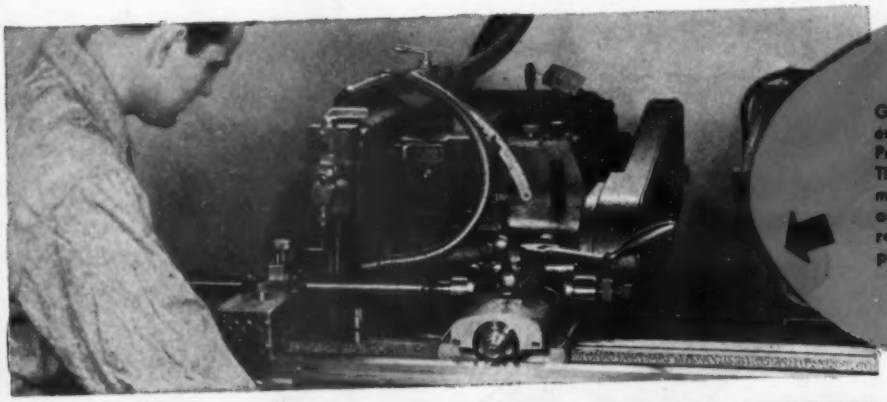
**CONTINENTAL TOOL WORKS**

*DIVISION OF EX-CELL-O CORPORATION*

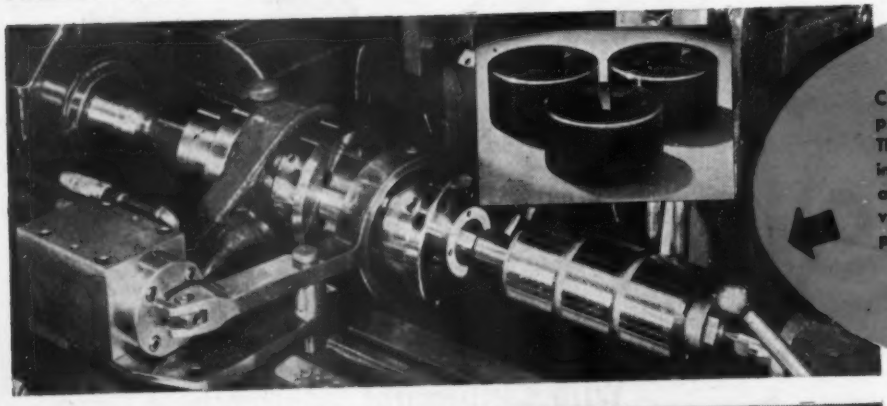
**DETROIT 6, MICHIGAN**

45—118

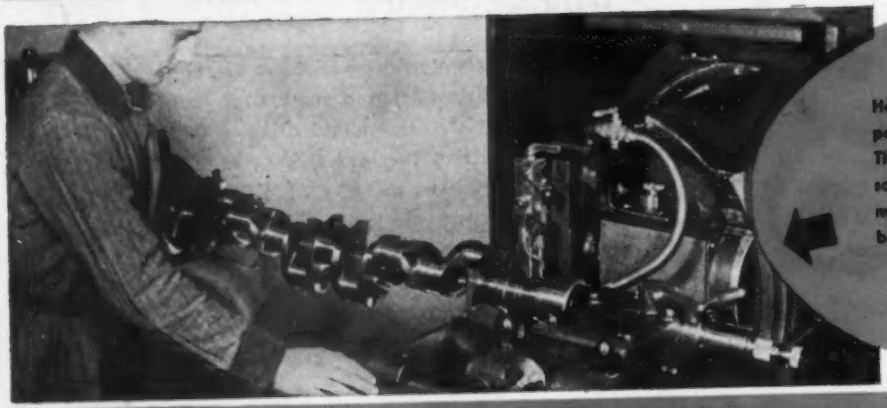
# For THREADED



Grinding threads to close tolerance on steel engine part, using an Ex-Cell-O Style 33 Precision Thread Grinder with a 12" swing. The machine is equipped with an approximate work locator to facilitate loading and an automatic retract and rapid traverse return for one-way grinding. The job is completed in two passes—one rough cut and one finishing cut. Production is good.



Cylindrical thread rolling dies are being precision ground here on Ex-Cell-O Style 33 Thread Grinder, equipped with pneumatic indexing fixture that is automatically operated by the machine. This Ex-Cell-O developed indexing fixture can be operated pneumatically, hydraulically, mechanically and manually.



Holding to close limits and maintaining good production, this Ex-Cell-O Style 5C Precision Thread Grinder is grinding threads from the solid on a steel crankshaft. Machine equipment includes live tailstock center assembly, bell-type headstock center, and approximate work locators to facilitate loading.

## EX-CELL-O CORPORATION

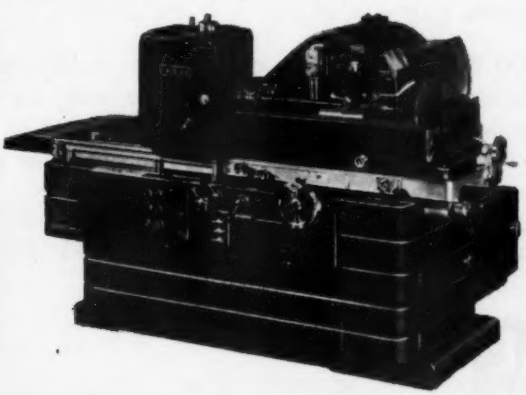
# WORK with Accuracy and Finish

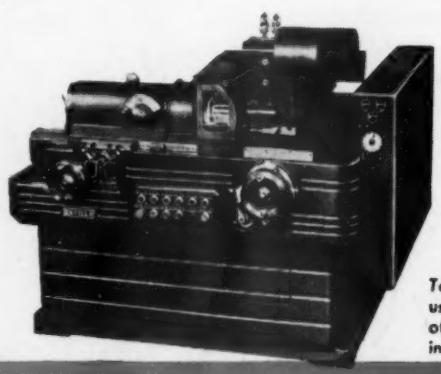
XLO
EX-CELL-O for PRECISION

## Use EX-CELL-O Precision Thread Grinders

**Wherever accuracy in threaded parts is necessary—accuracy of thread form, size, lead and finish—*thread grinding* is important. Not only does it assure precision work, but frequently it means increased production and lower costs . . . and the reduction in service failures of the parts when in use. Where *hardened* threaded parts must be finished to a high degree of accuracy, *thread grinding* is almost indispensable. Ex-Cell-O has developed precision thread grinding to cover the many requirements of American industry for precision threaded work, for the grinding of internal as well as external threads. There are nine different styles of Ex-Cell-O precision thread grinders—all standard machines—making possible a very wide range of threaded work. Write now to Ex-Cell-O for complete information.**

*Below:* Ex-Cell-O Style 39-A Precision Thread Grinder for the production of *internally threaded* work. Operation is completely automatic except for resetting the grinding wheel, loading and unloading, and depressing the "start cycle" button.





*To right above:* Ex-Cell-O Style 35 Universal Precision Thread Grinder used for a large variety of work on both small and large production of external threads. Is adaptable for eccentrically relieved grinding and for internal grinding of straight line and radius form threads.

**Standard and Special Multiple Way-Type Precision Boring Machines**

•

**Multiple Drilling and other Special Purpose Machines**

•

**Precision Thread Grinding Machines**

•

**Precision Lapping Machines**

•

**Broaches and Broach Sharpening Machines**

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**Continental Cutting Tools**

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**Tool Grinders**

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**Hydraulic Power Units**

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**Drill Jig Bushings**

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**Fuel Injection Equipment**

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**R. R. Pins and Bushings**

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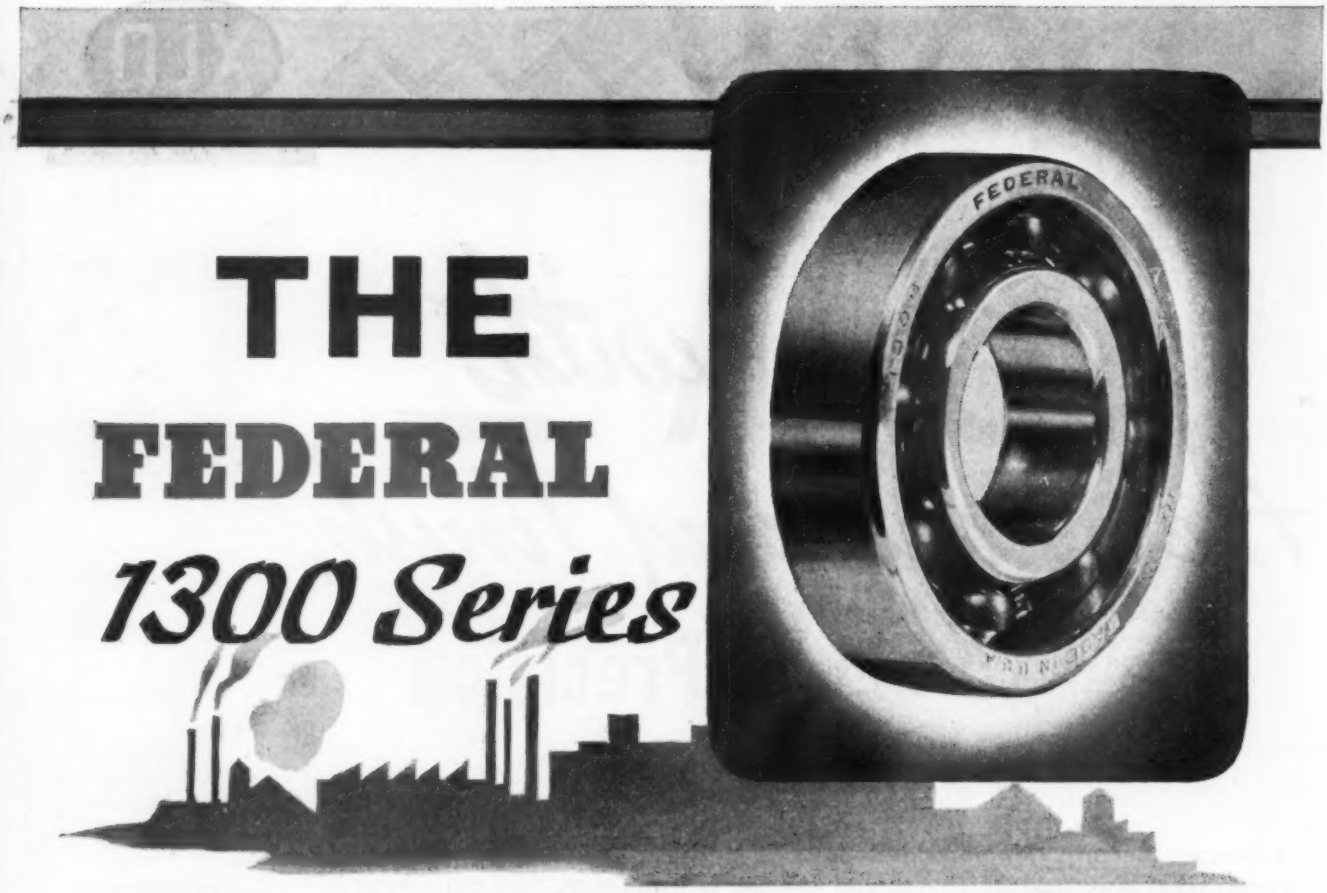
**Pure-Pak Paper Milk Bottle Machines**

•

**Aircraft and Miscellaneous Production Parts**

45—68

# DETROIT 6, MICH.




# THE FEDERAL *1300 Series*

## DOES A BIG JOB IN MANY DIFFERENT INDUSTRIES

**One of the outstanding characteristics of Federal 1300 Series, is adaptability to many different products. These bearings are used in fractional horse-power motors, fine machine tools and in the transmissions of motor cars and trucks.**

**Federal 1300 Series long ago gained the endorsement of engineers and designers in various industries. During the war, these precision ball bearings served our armed forces on all battlefronts. Today, true to Federal tradition, 1300 Series is doing a big job in post-war production.**

**If you seek medium-sized ball bearings of the same high Quality — use Federal 1300 Series in your plant, or product.**

**FEDERAL**
**BALL BEARINGS**
*THE JEWELS OF INDUSTRY*

**THE FEDERAL BEARINGS CO., INC.**

*Makers of Fine Ball Bearings*

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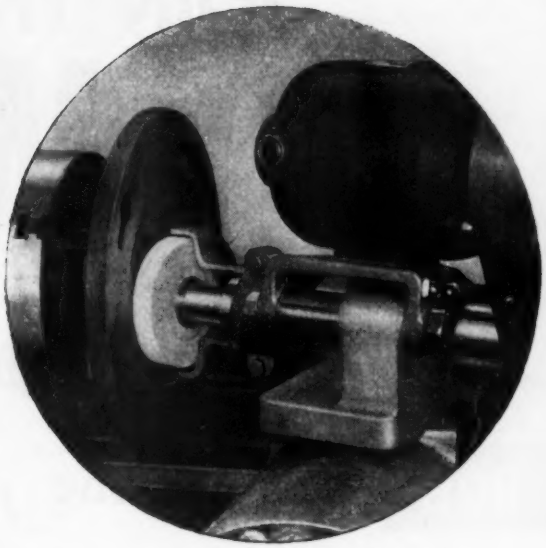


# A GOOD PORTABLE TOOL POST GRINDER . .

. . . that may be used efficiently and effectively on bench, lathe, shaper, planer, or miller. It can well become the busiest little machine in your plant. For it can do a multitude of internal, external, face, and taper grinds, and do them fast and accurately. Because of Lempco's exclusive frame design, you get the equivalent of two different length quills at no extra cost because both the motor and the grinding quill may be adjusted 2" in or out. Available in the handy fitted portable chest illustrated.

★ ***PRE-LOADED MATCHED SETS OF BEARINGS***

★ ***RIGID 1-PIECE FRAME***

★ ***6,000 TO 13,000 R.P.M. SPINDLE SPEEDS***

**LEMPCO**

**5711 DUNHAM ROAD**
**BEDFORD, OHIO, U.S.A.**

***WRITE FOR CATALOG***

# JOIN THE SWING TO
# AC Welding
## —CUT POSTWAR WELDING COSTS!

**HOW** By replacing your present rotating type d-c machines with money-saving Ampac a-c welders.

**WHY** Because Ampac's lower power consumption offers you lower cost of operation!

COMPARISON TEST PROVES AMPAC'S GREATER ECONOMY

Here are the results of an actual test comparing the performance of Ampac a-c transformer type welder with that of a d-c motor-generator type machine.

**1. MACHINES COMPARED**
A leading 200 ampere d-c motor-generator type welder . . . and an Ampac 200 ampere a-c welder.

**2. KW INPUT TEST**
(*Same* current output — using same type electrode) . . . d-c welder averaged 9.3 kw . . . while Ampac "200" averaged 5.2 kw.

**COST ANALYSIS:**

**3. IDLING LOSS TEST**
DC unit showed an idling rate of 1.63 kw . . . economical Ampac "200" had idling rate of only .09 kw.

**COST ANALYSIS:**

**4.** This means that Ampac delivered the same power to the welding circuit as the d-c machine — yet drew only 56% as much electrical current. And, when idling, Ampac had but 6% of the d-c unit's idling loss. Definite facts — proving that Ampac *can* cut the cost of postwar weld production.

RIGHT NOW the challenge of competitive postwar markets demands *greater* manufacturing speed — *lower* production costs!

Fabrication by welding — fast and dependable — is one answer to that challenge. And for *top* weld performance select Ampac a-c units. Get full details on the complete Allis-Chalmers line of welders, electrodes and accessories from our nearby welder dealer or district office. Or write direct to ALLIS-CHALMERS, MILWAUKEE 1, WIS. A 1920

**ALLIS-CHALMERS**

HEAR THE BOSTON SYMPHONY: *Saturday, American Broadcasting Co.*

The CONE AUTOMATIC MACHINE COMPANY

sees many

GOOD THINGS AHEAD

***It is reported that . . . . . .***

The National Research Council is compiling a directory of industrial research laboratories of which there were 2,264 in 1940 when the last listing was made.

get ready with CONE for tomorrow

Said to be the largest government-owned plant yet leased for civilian use, a 21 million dollar factory is being converted for the making of streamlined trains. *Edward G. Budd, Philadelphia.*

get ready with CONE for tomorrow

Experimental track-type tractors are using rubber tracks quite similar to those used on children's toys. *B. F. Goodrich.*

get ready with CONE for tomorrow

A new technique, using an electric arc, makes it possible to cut industrial diamonds four times faster than the conventional method. *National Bureau of Standards.*

get ready with CONE for tomorrow

An aviation magazine estimates that American domestic and international air carriers will put almost $750,000,000 in equipment in the next five years. *Aviation News.*

get ready with CONE for tomorrow

A unique type of power transmission, which is positive and yet prevents gear breakage in case of jamming, uses metal gears meshed with gears of an elastic vinyl resin. *Resistoflex Corp.*

get ready with CONE for tomorrow

Tooling has begun for the production of a calculating machine that automatically figures dividends, hourly pay rolls, writes checks and keeps records at 4,000 per hour speed. *Addresso-Multigraph Corp.*

get ready with CONE for tomorrow

A dry cell developed for the Army is reported to have 5 times the shelf life of ordinary batteries. A 93.6 volt radio battery of 72 cells weighs only 2 pounds. *Engineering & Mining Journal.*

An oxy-acetylene cutting unit developed by the Navy can be carried on the operator's back and used without setting it down.

get ready with CONE for tomorrow

One of our admirals reports that welded ships have proved to be stronger than riveted ones during the war. *Admiral Emory S. Land.*

get ready with CONE for tomorrow

The American optical industry is now producing, by automatic, mass production methods, lenses superior to those formerly made by hand in Germany.

get ready with CONE for tomorrow

The Army has been using a very compact radio communication system that can carry facsimile pictures, telephone conversation and teletype messages all at once.

A new pocket-size instrument reports power output and efficiency to the pilot of a plane by measuring constantly the deflection of the engine under the force of explosions. *Consolidated-Vultee.*

get ready with CONE for tomorrow

Claims for a new rubber cement include adhesion to metals, plastics and ceramics; shear strength of 3,250 pounds per square inch and tension strength of two tons. *B. F. Goodrich, "Plastilock"*

get ready with CONE for tomorrow

The first section of the Society of Automotive Engineers to be established outside continental United States has been organized in the Hawaiian Islands.

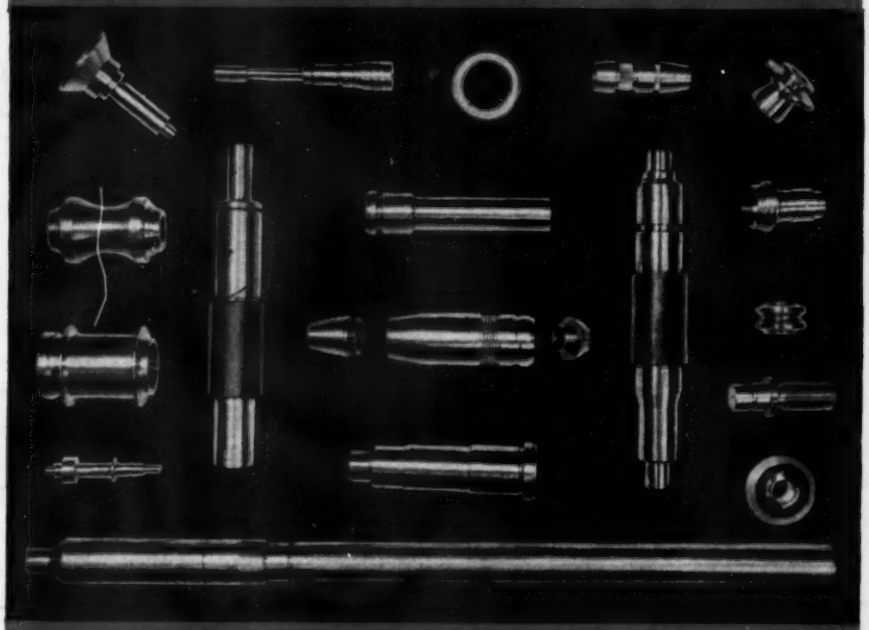
get ready with CONE for tomorrow

A new electrical device analyzes the composition of metal and indicates its maximum endurance. *Electrical Manufacturers Public Information Center.*

get ready with CONE for tomorrow

A new stainless steel is soft and ductile enough to be formed and fabricated like aluminum. *Rustless Iron & Steel Corp., Baltimore.*

*Keep ahead with production savings from parts produced on the 8-Spindle Conomatic.*



CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U. S. A.

22

# simultaneous ROUGH and FINISH MACHINING at 3500 to 4000 surface feet per minute

## G. & L. Makes Both Intermittent and Continuous Cuts on Tough Aluminum Alloy Castings in Single Pass of Work...Using One or Two Tool Bits for Dual Operation

It was necessary to devise an entirely new machining method to finish these special alloy aluminum castings. Conventional cutters and customary feeds and speeds used on several different machine tools would not produce parts to meet the following rigid requirements:

Surface flatness
Surface finish
Surface alignment

A G. & L. Horizontal Boring, Drilling and Milling Machine equipped with single point tungsten carbide cutters properly ground and mounted in simple tool holders produced parts to meet the above specifications. In addition, the castings were completed in less time and at less cost.

## TOOLING FACTS

Single point and two-lipped fly cutters are substituted for ordinary milling cutters, end mills, and face mills. Tool holders are made in sizes up to 30" in diameter from mild steel discs to give greater cutting speed and to cover the entire work surface of the piece.

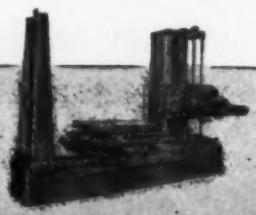
Either one or two carbide tipped tools are mounted on the plate. Cutters work equally well roughing and finishing, and on *continuous or intermittent cuts even to a depth of 3/8" at a surface speed of 3500 to 4000 feet per minute.* Horizontal boring machine rapid traverse is often used to obtain sufficient feed for this work.

Then to obtain a fine finish on narrow parts where a slightly concave surface is not objectionable, the single point tool is tilted slightly in the holder to permit the heel of the cutter to drag. Here the single tool acts both as a rougher and finisher.

A large positive rake angle ground on the cutters helps to reduce the cutting pressure on the work. This proves important when thin and frail parts are machined. A negative back rake of 25-30° and a side rake of 15° is nearly always used.

## ADAPTABILITY OF G. & L. MACHINES

This is another example showing how G. & L.'s are meeting difficult machining requirements through versatility of operation. In this case, work ordinarily routed over several individual machines is handled more easily and in less time on a Giddings & Lewis Horizontal Boring Machine. G. & L. engineers will gladly recommend complete machining methods and tooling requirements for your particular needs.



Right: G. & L. Table Type Machine.

Right: G. & L. Floor Type Machine.

**GIDDINGS & LEWIS**
**138 DOTY STREET**

## MACHINING SURFACES IN TWO PLANES WITH ONE CUTTING TOOL IN A SINGLE WORK SETUP

**Production Facts**

Machine bottom of recess
Machine outer top surface
Spindle speed 1500 rpm (High Speed Spindle)
Feed 7½" per minute
Bottom of recess must be parallel with outer top surface within .004"
Special two-bladed fly cutter

## TWO TOOLS DIAMETRICALLY OPPOSED ON 28" FLY PLATE

**Production Facts**

Rough face—remove .040"
Finish face—remove .010"
Spindle speed 450 rpm (Main Spindle)
Feed 6" per minute
Surface must be flat within .002"
Opposed mounting of cutting tools on fly plate

## ROUGH AND FINISH FACING WITH TWO SINGLE POINT TOOLS

**Production Facts**

Rough face—remove .100"
Finish face—remove .010"
Spindle speed 450 rpm (Main Spindle)
Feed 5" per minute
Surface must be flat within .002"
Single point tools mounted in extension bar attached to fly plate

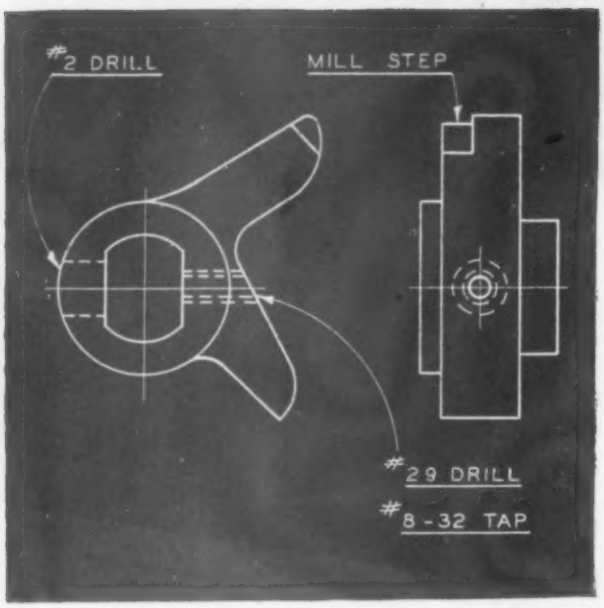
*Photographs Courtesy General Mills, Inc., Mechanical Division, Minneapolis, Minnesota.*

# MACHINE TOOL CO.

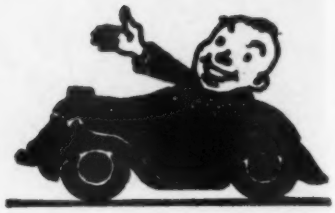
**FOND DU LAC, WIS.**

## FREE...Field Production Facts

will help you solve difficult machining problems. Write today for your copy of Trade Journal Advertising covering advanced G. & L. machining methods. Please indicate your business connection.




THIS IS A FLEXIMATIC AUTOMOTIVE JOB!



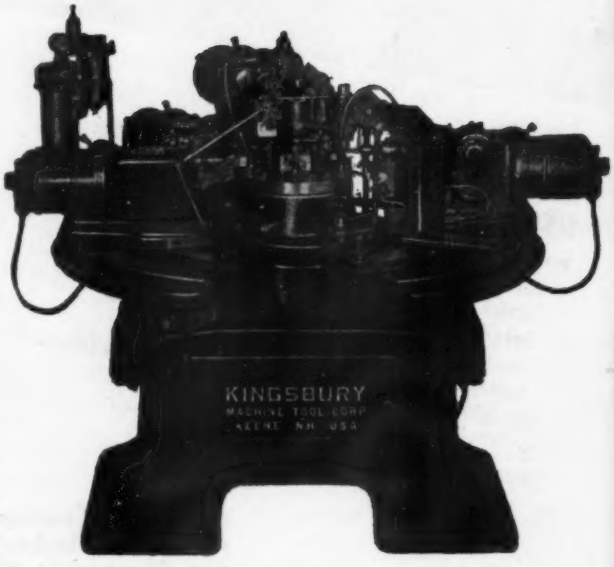
# FLEXIMATIC

## by KINGSBURY

*Flexible, Automatic, and Fast . . . !*

Even such a small part as an automobile door latch presents an opportunity for savings when a Kingsbury FLEXIMATIC is used to produce them. The machine illustrated performs four operations—drilling two holes, tapping and milling—finishing these brass forgings at unbelievably high speeds. And, in adding to the ease and economy of FLEXIMATIC operation is the fact that this machine doesn't even have to be unloaded! The operator merely loads the work and clamps it. It is automatically unclamped and ejected.

Kingsbury FLEXIMATICS are made up of standard units for drilling, milling, tapping, etc. — as many as necessary — mounted in any position on one of several types of standard bases. This Kingsbury method of standardizing the various units of assembly results in a machine that can easily be changed to meet changes in design and production . . . a FLEXIBLE, an AUTOMATIC, a FAST production machine.




KINGSBURY MACHINE TOOL CORPORATION

KEENE NEW HAMPSHIRE U S A

# "GENTLEMEN — LET'S NOT KID OURSELVES . . . WE MUST START NOW TO REDUCE PRODUCTION COSTS!"

"Postwar competition will be keen. The time is coming — and coming soon — when we'll have to scrutinize every item of cost carefully, in order to produce economically."

● Management is right! Now is the time to consider ways and means of reducing production costs. Plan now on using standard machine tools and attachments instead of expensive, cost-upping, single purpose equipment.

It's really surprising, for example, the great variety of milling operations that can be handled by Kempsmith Standard Attachments mounted on a standard milling machine. These precision-built attachments have proven their ability to handle both accurate tool-room operations and difficult production milling jobs, reducing costs to rock bottom.

Investigate the versatility of Kempsmith Standard Milling Attachments. Write today for literature.

**THE KEMPSMITH MACHINE CO.**
1821 S. 71st STREET MILWAUKEE 14, WIS., U. S. A.

# KEMPSMITH

LEFT — A Kempsmith Vertical Head and 16" Circular Milling Attachment mounted on a standard Kempsmith Type G machine, milling exteriors of head frames for Dividing Heads. Note the deep, smooth cuts taken on the incomplete circles.

*Precision Built · Milling · Machines Since 1888*

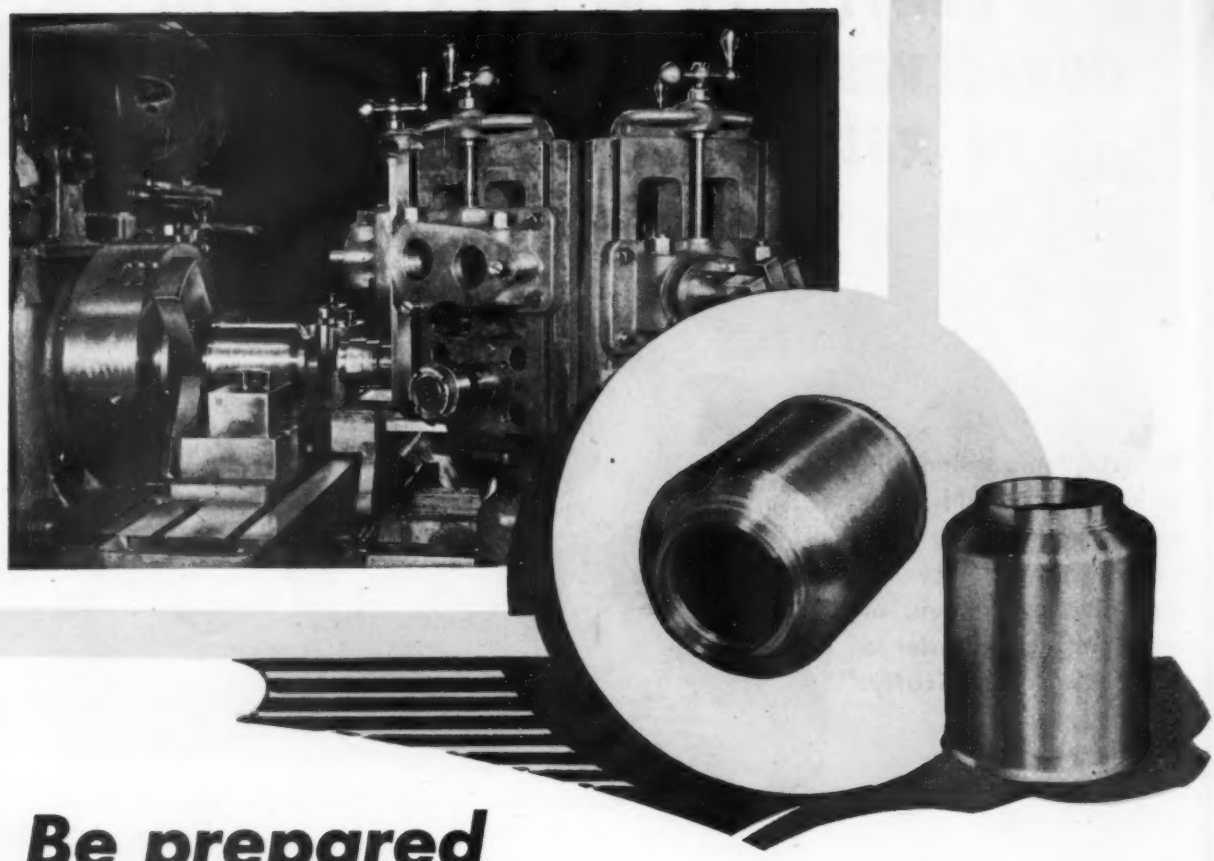
*Write Today!*

KEMPSMITH — Yes, I would like literature describing Kempsmith Attachments. Mail to:

NAME _____ TITLE _____

FIRM _____ ADDRESS _____

A 4844-1P-C



# *Be prepared for Peace . . .* BY RE-TOOLING YOUR P & J AUTOMATICS—NOW!

## YOU SPECIFY THE PART — P & J WILL DESIGN THE SET-UP

You can keep your present P & J machines right on the job when peace comes and get many more years of useful, profitable service from them by having them changed over for other work.

Shown here is a P & J Type 5DLX Automatic Chucking and Turning Machine handling fast, accurate machining operations on cylinders. The tooling for this job can be readily changed over for low cost production of other parts without sacrificing the speed, convenience and record-making productive performance inherent in all P & J equipment.

P & J Re-tooling offers users of P & J equipment the means of making the changeover quickly so that machines will be back on the production line in shortest possible time. It will be to your advantage to consult our engineers immediately on your reconversion problems.

**THE POTTER & JOHNSTON MACHINE CO.**
**Pawtucket, R. I.**

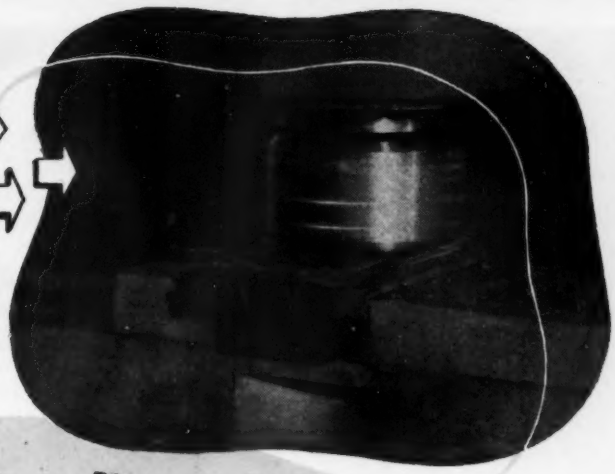
### P & J Rebuilding Service

P & J offers complete facilities for thoroughly rebuilding customers' P & J Automatics in our shop and restoring them to original productivity and accuracy. Re-tooling can also be handled at the same time.

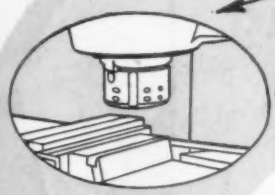
**A BOND is a good buy for you and a "GOOD-BYE" to tyrants**

# KENNAMILLING

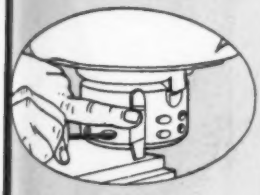
## A *Simple* MEANS TO DO HIGH RATE CARBIDE MILLING, ON *ALL* TYPES OF METAL, WITH AVAILABLE EQUIPMENT



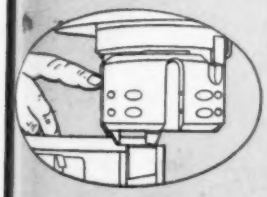
### THE KENNAMILL FOR *Face-Milling*



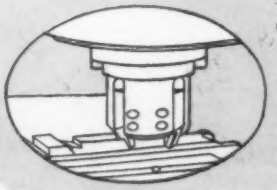
1. Table is adjusted so that distance between surface of work and bottom of cutter head is equal to depth of cut, plus 1/8" for clearance.



2. Blade is locked in No. 1 slot, positioned so its nose rests on workpiece. Table is withdrawn, adjusted to desired depth of cut, then a swath is fly-cut in workpiece.

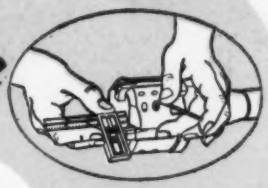


3. Fly-cut swath in workpiece provides a corner into which second, third, and fourth blades are fitted.

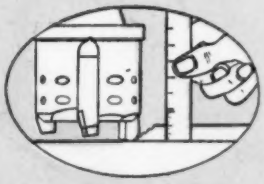


4. With face-mill setting, maximum production is obtained where available power is adequate to permit chip loads of over .005".

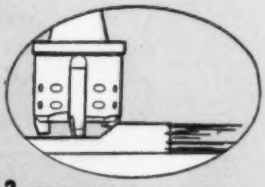
### THE KENNAMILL FOR *Step-Cutting*



1. Kennametal-tipped blades, made especially for Kennamills, are set in cutter head, to a scale.



2. Work is distributed over four blades by dividing the desired depth of cut into four steps.



3. With step-cut setting, high rates of milling are possible where power is a limiting factor.

**VERSATILE** Kennamill Step-Cutters extend profitable application of the exceptional metal-cutting ability of tough, hard Kennametal. The cutter head is a permanent toolholder which can be used for high rate carbide milling on steel, cast-iron, and non-ferrous materials simply by interchanging blades having tips of the proper grade of Kennametal.

**ADAPTABLE** The Kennamill is adaptable for either step-cutting or face milling, as illustrated. Standard 39M40 blades (steel-cutting) and 39K40 blades (for cutting cast iron and non-ferrous materials) have a cutting edge 3/16" long, which provides for cuts up to ½" deep, with step-cut setting. By grinding a longer cutting edge, these blades are used for cuts up to ½" or more, with the face-mill setting.

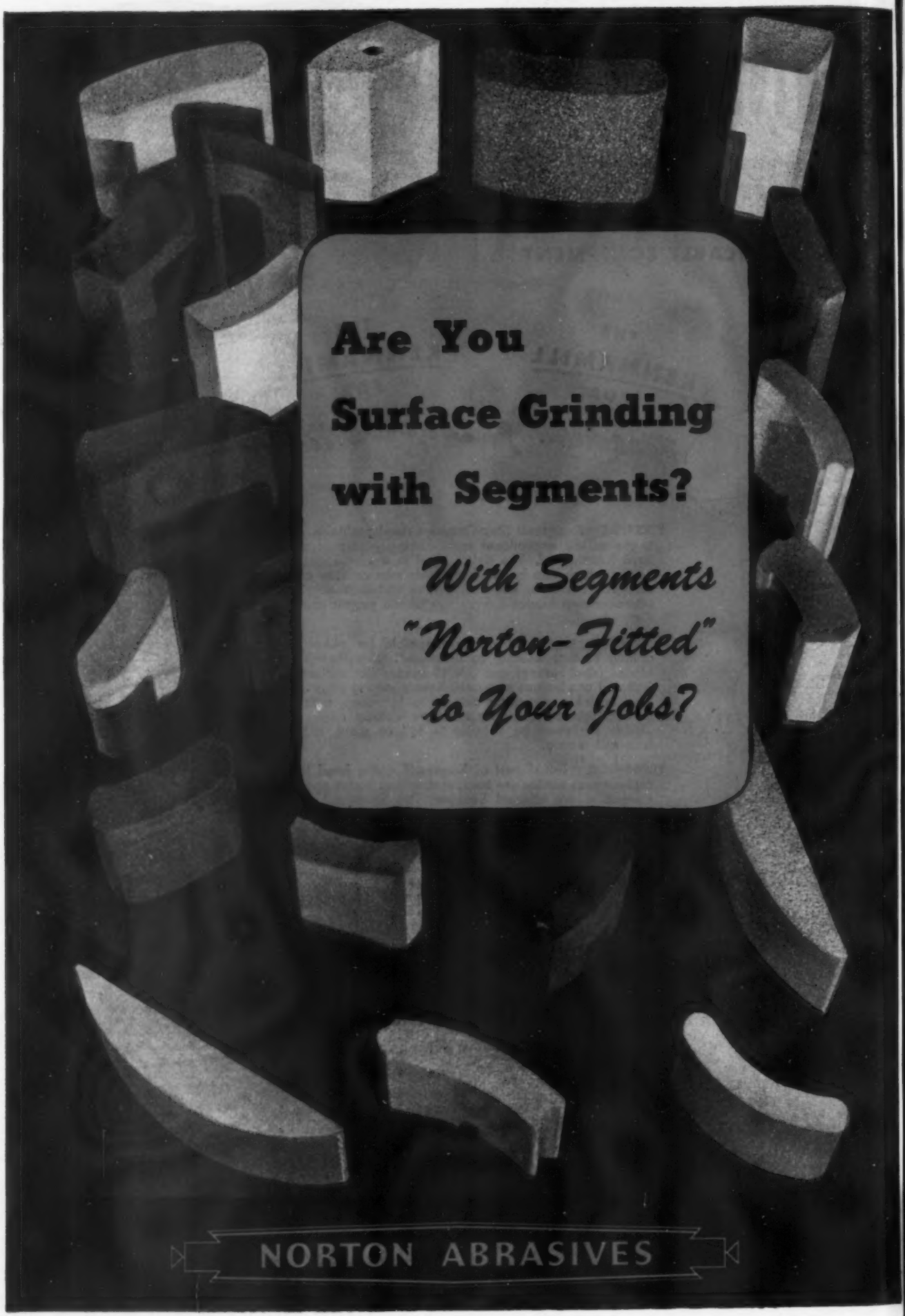
**ECONOMICAL** Initial cost of Kennamill cutter head is low; replacement blades are inexpensive; and major operating economies are effected because: The Kennamill is easy to set-up; Down time is minimized because cutter head does not have to be removed from machine for blade replacement; Blades can be reground on simple carbide tool grinder.

**PROFITABLE** The Kennamill is one of the most *useful* and *profitable* tools you can install because: *It enables you to do diversified milling jobs, at high production rates, at less cost, with available equipment.*

Catalog 45 gives full particulars on Kennamilling.
A copy is yours for the asking.

KENNAMETAL
SUPERIOR CEMENTED CARBIDES
KENNAMETAL *Inc.*, LATROBE, PA.

Blades are Resharpened to Template on Ordinary Carbide Tool Grinder. Grinding in head unnecessary.


Are You
Surface Grinding
with Segments?
With Segments
"Norton-Fitted"
to Your Jobs?
NORTON ABRASIVES

An Indiana company wanted to increase production on the surface grinding of certain war parts of stainless steel (18-8, 2% molybdenum). They were being ground on an open side surface grinder and were received badly warped at times. Norton specified segments of the new 57 Alundum abrasive (57A301-K8VBE). They cut faster, gave 10% longer life and required less dressing than previous segments.

A plant was surfacing stainless steel bushings (MS 6330, Rockwell C 56-58, 2" diameter, ⅝ to ¾" thick) on a vertical spindle machine removing .025". Norton 19 Alundum, B-E bond OPEN STRUCTURE Segments (19A601-E12VBEP) gave 35% longer life than competing wheel and a faster, cooler cutting action.

A Pennsylvania manufacturer was surfacing steel links about 18" x 12" x 1" — three at a time on the chuck of a vertical surface grinder. Table speed was 20 r.p.m. and stock removal up to 3/16". Changing to Norton 38 Alundum B-E bond segments (38A30-H8VBE) brought costs down to 19 cents per link as compared to 23½ and 27 cents previously.

CHANGING to Norton Segments can result in savings like these because the variety that is available to choose from makes possible accurate fitting to the job.

Let a Norton abrasive engineer study your segment jobs. He can choose from five abrasives—Alundum, 19 Alundum, 38 Alundum, 57 Alundum and Crystolon. For bonds he can use vitrified, B-E vitrified, resinoid, shellac or silicate. He can go as coarse as 8 for grain size or as fine as 500. Grades can be way down in the soft range such as C, C+, D, D+, E, E+ and on up to the hardest necessary. Structures vary from as dense as No. 5 to as open as No. 12.

Yes, your Norton abrasive engineer can select just the right segment for any surfacing job—he has the complete Norton facilities at his disposal.

**NORTON COMPANY • WORCESTER 6, MASS.**

*Distributors in All Principal Cities*

NORTON SEGMENTS are stocked in the commonly used specifications for all popular makes of chucks.

**NORTON OPEN STRUCTURE segments are making outstanding records** on many surfacing jobs — especially where contact is broad or stock removal exceptionally heavy. Their large pore space means bigger chip chambers and more room for coolants — gives a faster, cooler cutting action.

NORTON ABRASIVES

# This complete 3 way

## Has Proved Its Value in

### Investigate its advantages now
### . . . to help speed reconversion

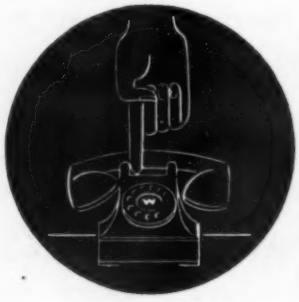
To help industry keep electrical equipment at peak production efficiency, has been the number one job of the nationwide Westinghouse Maintenance organization. In addition, many special assignments have been undertaken for the Army, Navy and Air Forces.

With most plants short of skilled maintenance help, this war-expanded service has proved its value to all types of industries—in speeding repairs, in diagnosing steam and electrical troubles, in providing prompt renewal parts service.

All of these greatly expanded repair facilities are now available to aid industry in speeding reconversion and reconditioning of war-worn equipment. Why not investigate the advantages of this service *now?*

Experienced service engineers . . . factory-trained repairmen . . . special machines and testing equipment . . . local stocks of Westinghouse Renewal Parts . . . offer a combination unmatched by any other service organization.

*Dial "Westinghouse"*



For information or service, phone your nearest Westinghouse office and ask for "Maintenance". Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-96006

This "Factory-Proved" tag, attached to each piece of apparatus repaired by Westinghouse, is your guarantee that the job has been done by men trained in factory methods, using factory-proved methods and materials, and has been tested to factory specifications.

**Keep Your Electrical Equipment Up to Par with:**

# Westinghouse

*Maintenance Service*

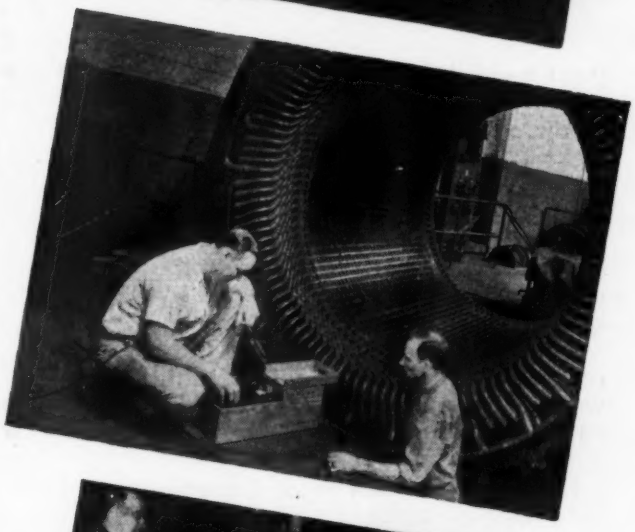
**REPAIRS • • PARTS • • ENGINEERING**

# maintenance service

## Scores of War Plants

### 1 FOR FASTER REPAIRS

Local Westinghouse Manufacturing and Repair Plants are especially equipped to repair, remodel or recondition your electrical machines or apparatus. This service includes rewinding motors, generators and transformers; rebuilding commutators; replacing or building up worn parts. Special testing equipment is used for dynamic balancing and high-frequency testing.



### 2 FOR ENGINEERING HELP

For major electrical and steam repairs, there are Westinghouse engineers near you with wide experience on repairing such equipment. They are prepared to diagnose your electrical and steam troubles, give you emergency repair service, and help you with engineering problems.

### 3 FOR RENEWAL PARTS SERVICE

Prompt delivery of standard renewal parts can be obtained from your closest Westinghouse Renewal Parts Warehouse. Stocks on hand include parts normally subject to wear or burning, such as contact tips, shunts, arc chutes, operating coils, armature and field coils, bearings, etc.

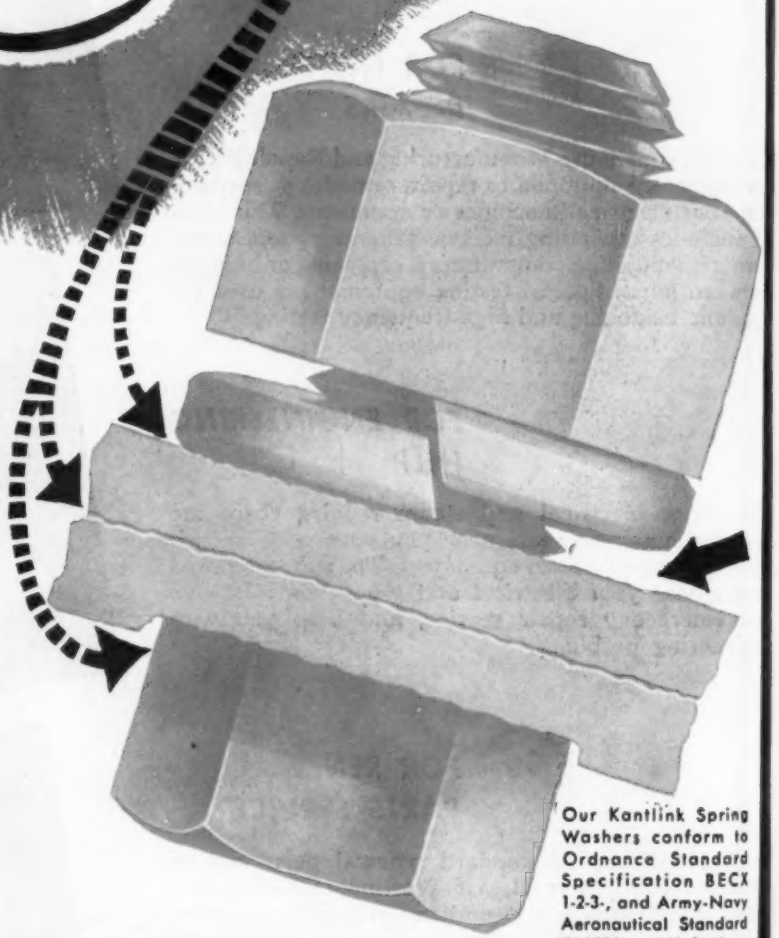
### NEW MAINTENANCE MOVIE

If you have not seen the new Westinghouse movie, "Theory and Maintenance of Commutation", call your nearest Westinghouse office for information about showing the film to your maintenance group

WESTINGHOUSE

# LOOK THERE ..... MR. ENGINEER

*That's where the (RAT)TLE is-*



Don't worry about the nut;—nuts don't budge while there's even the slightest pressure between their threads and the threads of the bolt.

But below—down there between those other contacting surfaces—there's the rub—there's the (rat)tle—there's the vibrational wear that loosens all other parts unless you use a powerful live spring washer.

Kantlinks—the big powerful long-range spring washers—retard initial wear as it occurs, and keep expanding as fast and as far as wear develops. They hold all parts tight.

No matter whether you use a standard nut or any one of the many fixed or lock-nuts be sure to specify also a strong spring washer.

For real bolted security specify Kantlinks.

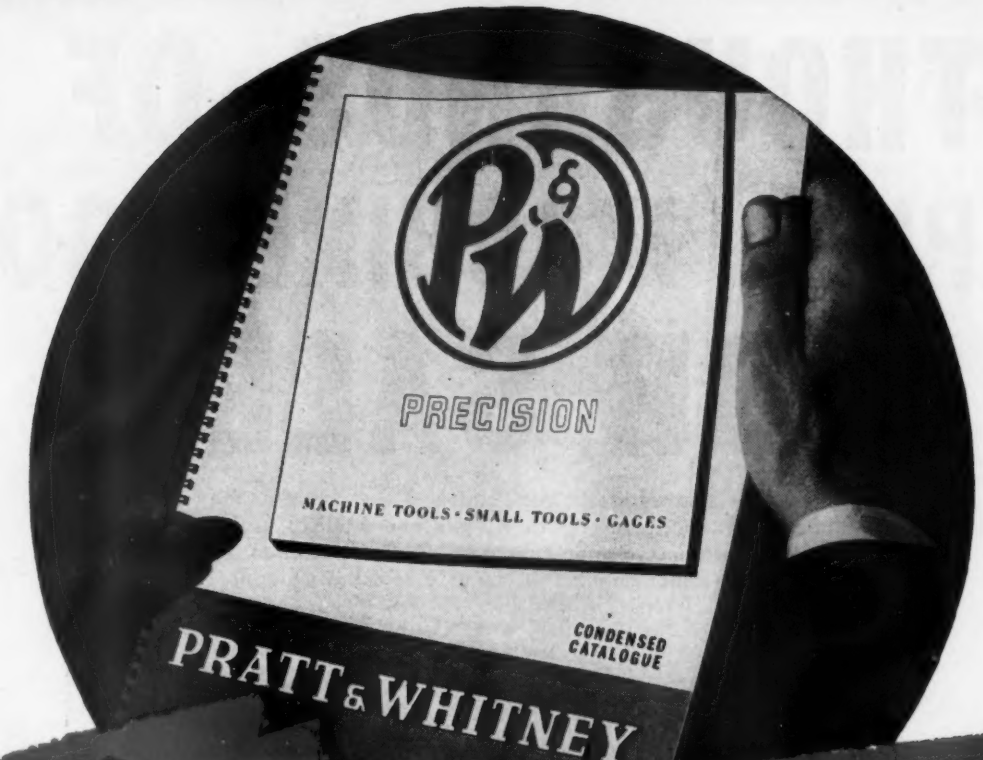
Send today for descriptive folders.

Our Kantlink Spring Washers conform to Ordnance Standard Specification BECX 1-2-3-, and Army-Navy Aeronautical Standard AN 935, and U. S. Navy drawing 12-Z-22.

**Originators of KANTLINK the long-range spring washer**

# THE NATIONAL LOCK WASHER COMPANY

**NEWARK 5, NEW JERSEY** **MILWAUKEE 2, WISCONSIN**




# Announcing

## THE PRATT & WHITNEY CONDENSED CATALOGUE

Now — for the first time under one cover — is a condensed but comprehensive picture of Pratt & Whitney's hundreds of machine tools, small tools, and gages.

Obviously, this catalogue cannot contain complete information on any one machine or tool . . . but there are sufficient data to give a very clear picture of each type.

At a glance, the reader can see the broad service Pratt & Whitney is equipped to render industry and how wide is the variety in each classification. We suggest that you keep this catalogue handy as a quick reference. Then when you wish full information on any particular product, simply request it of Pratt & Whitney.

Your copy of this 72-page Condensed Catalogue will be sent you promptly . . .just mail the coupon below, or write us on your company letterhead.

**PRATT & WHITNEY**

*Division Niles-Bement-Pond Company*

**WEST HARTFORD 1, CONNECTICUT**

PRATT & WHITNEY, Dept. AD-5
*Division* Niles-Bement-Pond Company
West Hartford 1, Connecticut, U.S.A.

Gentlemen: Kindly send me at once a copy of your new Condensed Catalogue.

Name and Title _____

Company _____

Address _____

# THOUSANDS OF SURPLUS MACHINE TOOLS FOR SALE

There will be a lot of used machine tools of every kind on the market, even Cincinnati Hypro Planers and Vertical Boring Mills, because some were only needed for war production. To satisfy certain requirements this means a real buying opportunity.

**BUT—**

1—Be sure the Planer is only a *USED* and not an *abused* machine.

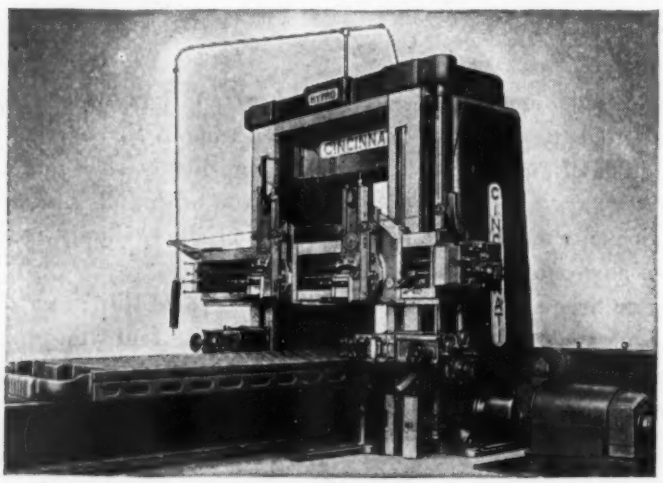
2—Check with the manufacturer for certain specifications such as cut speeds available, gear ratio, etc., to make sure the machine meets your requirements.

3—Insist on someone who is qualified and acquainted with machine tools to personally inspect the machine, especially the bed and table ways.

4—Don't buy from a bill of sale description only.

5—Make sure that the used machine plus the cost of putting it in first-class condition will not exceed the cost of a new improved Hypro.

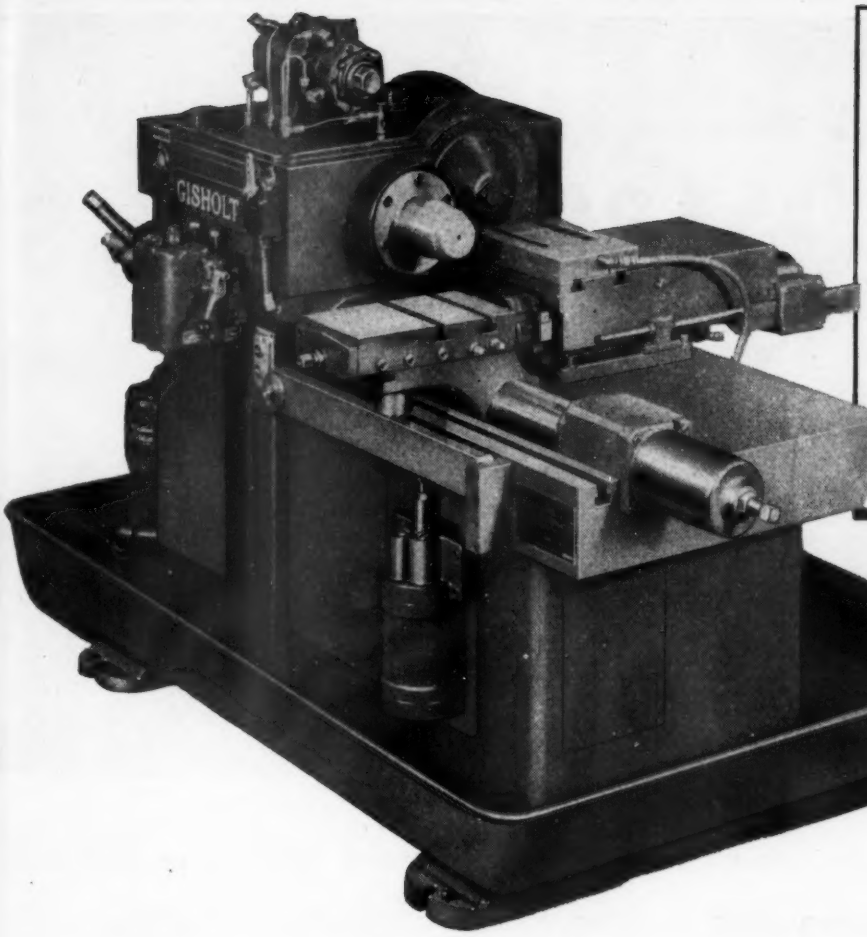
A lot of jobbing shops and maintenance departments will find a used Hypro sufficient for their needs, but if you must have the high speed with accuracy and numerous other new features that postwar competition will demand, write us for catalogs describing our new machines.



**THE CINCINNATI HYPRO PLANER COMPANY**

PLANERS · BORING MILLS · PLANER TYPE MILLERS

CINCINNATI, OHIO



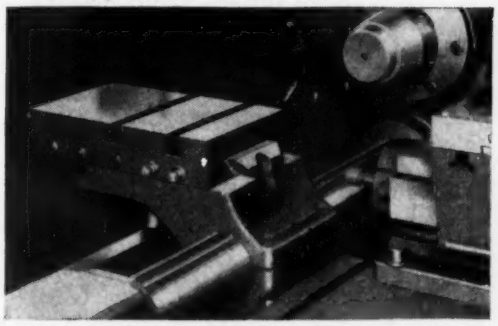

# The GISHOLT HYDRAULIC AUTOMATIC LATHE

## WHY IT HANDLES MORE JOBS

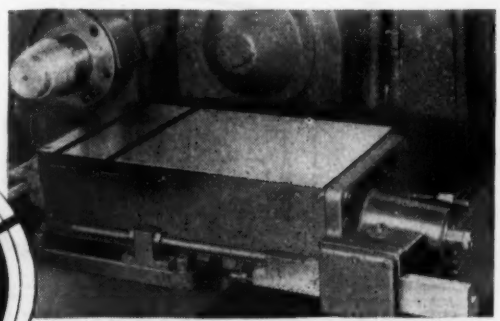
## *more easily*

The reasons for the remarkable versatility of the Gisholt Hydraulic Automatic Lathe lie in its extremely simple design. And this simplicity also accounts for its easy change-over from job to job.

1. There is no changing of cams and gears for different jobs.
2. The front carriage can be clamped in any desired position, making it easy to arrange tooling to best advantage.
3. By simple nut adjustment, there is an infinite variety of feeds from .000″ to .058″ for either front or rear carriage.
4. Rapid traverse and feed stops are quickly and easily changed by simple, single screw adjustments.
5. In partial trial cuts, in change of set-up, it is not necessary to run the machine through its entire cycle. Front or rear tools may be operated separately and independently—may be arrested at any point and returned to starting position.



*Note how front carriage is clamped upon a heavy, horizontal, circular bar. The wide, heavy top with T slots, permits mounting standard or special tool blocks in various arrangements. A graduated micrometer screw is provided for adjusting tools to diameter.*



*This rear slide is a complete self-contained unit which can be readily mounted in any position, to feed in any direction, and at any desired rate of feed.*

The outstanding versatility of the Gisholt Hydraulic Automatic Lathe may be applied to a wide variety of chucking, between-centers and fixture-held work. Write for complete information.

**GISHOLT MACHINE COMPANY**
*1215 East Washington Ave. • Madison 3, Wisconsin*

***Look Ahead . . . Keep Ahead . . . With Gisholt Improvements in Metal Turning***

GISHOLT

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINES

# IS YOUR TOOL ROOM PREPARED TO GREET *Tomorrow?*

16" TOOL ROOM LATHE

New and better machines, equipment and methods have boosted American production to an all time high. In the days to come, keen competition will penalize the manufacturer who fails to keep pace with this continuing technological advance. New LeBlond Lathes will help you keep abreast of the march of production. This is particularly true in the tool room where accurate, low-cost production of tools and fixtures is an important factor.

With new LeBlond Lathes on the job, your tool room will be well prepared to greet tomorrow.

**AVAILABLE IN 12", 14", 16" AND 18" SIZES**

**LEBLOND FIELD ENGINEERS ARE AT YOUR SERVICE** to help you in your development work, particularly along the lines of the difficult, the "out-of-the-ordinary" turning problems. The accumulated knowledge of every manufacturing trend in good times and bad—peace and war—gained over a period of nearly 60 years from thousands of installations all over the world, is yours for the asking. Contact our nearest dealer or write Dept. FE 46.

**SINCE 1887**

the world has been turning to LeBlond for turning equipment.

★

***WRITE FOR CATALOG!***

THE R. K. **Le BLOND**

ARMY E NAVY KEEP BUYING BONDS AND KEEP THEM

**MACHINE TOOL CO., CINCINNATI 8, OHIO, U. S. A.**

NEW YORK 6, Singer Bldg., 149 Broadway, WOrth 2-0722
CHICAGO 6, 20 North Wacker Drive, STA 5561

**LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES**

# HARDINGE
ELMIRA, N.Y.

## ANNOUNCING A NEW MODEL
HIGH SPEED PRECISION LATHE

***FEATURING:***

Hardened and Ground Steel Dovetail Bed Ways.
Three Point Bed Mounting.
Center Drive Headstock.
Patented Positive Lock Slide Rest.
Index Slide Has Hardened and Ground Steel Top.
Full Bearing Tailstock Spindle.

***For complete information, write for Bulletin DV59***

**HARDINGE**
**DOVETAIL BED**
1" Collet Capacity – 9" Swing

©1945

**HARDINGE BROTHERS, INC., ELMIRA, N. Y.**
PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE

# alcoa aluminum

**They spin it . . .**

**Rivet it . . .**

**Weld it . . .**

**Bolt it . . .**

**CORONA SHIELD** *assembly, built for high-power, long-ware radio stations, by the Milwaukee Metal Spinning Company (Spincraft), Milwaukee, Wisconsin.*

**Built entirely of aluminum for two very special reasons: (1) ease of fabrication and (2) lends itself to high voltage applications.**

**The doughnut-shaped piece was made in two halves, spun from No. 11 gauge Alcoa Aluminum, welded together and the welds ground smooth. The tubular supports were flattened at one end, bolted and riveted to the mounting disc, and the opposite ends welded to the spun aluminum doughnut.**

**You can do so many things with Alcoa Aluminum alloys . . . and build better things—faster. Alcoa engineers will gladly discuss aluminum fabricating problems with you. ALUMINUM COMPANY OF AMERICA, 2107 Gulf Building, Pittsburgh 19, Pennsylvania.**

**ALCOA** FIRST IN **ALUMINUM**

ALCOA ALUMINUM

# SURPLUS MACHINE TOOLS IN *Your* RECONVERSION

**There'll be many of them on the market but that doesn't justify "half-masting" the now famous "production flag" to mourn their idleness or untimely burial.**

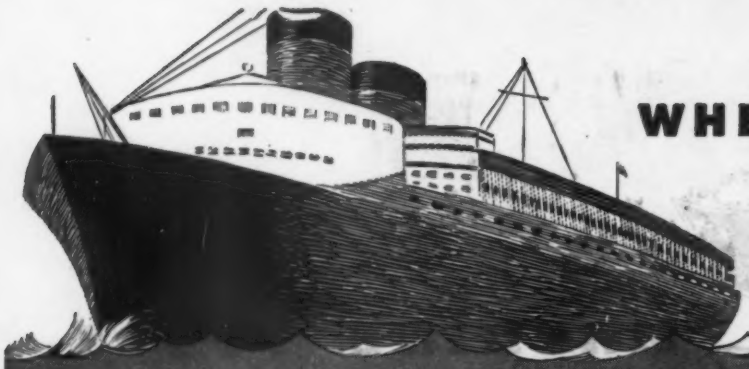
**As they performed a high speed war job, so they can be rebuilt to speed the equally essential productivity of reconversion as industry gears itself to a new era of production. An essential part of our service to users has always been the maintenance and rebuilding of our products, no matter how old, for Rivett precision Lathes and Grinders are "machine tools of a life time" and may be returned to our plant for inspection, reconditioning estimates and rebuilding with the same guarantee that goes with a brand new machine.**

**If you have a Rivett machine that has worked too hard, too long, and perhaps by the less experienced war-time operator, call our Service Department today and they will tell you how it can be reconditioned and equipped for the same or different operations in your machine shop.**

**Few machine tool builders can make this offer and guarantee. Rivett engineers will see that you get full "life time operation" from any Rivett Lathe and Grinder.**

**RIVETT**

**LATHE & GRINDER**
**INCORPORATED**
**BRIGHTON, MASS. U. S. A.**

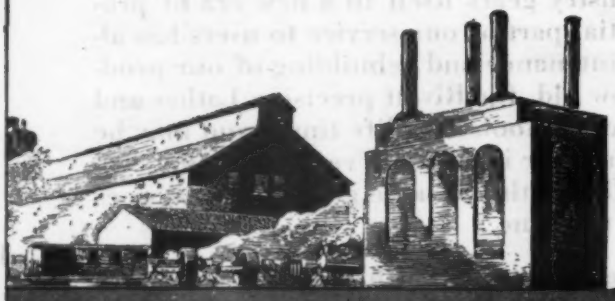


WHEREVER THERE IS

# WATER

WHEREVER THERE ARE

# RAILROADS



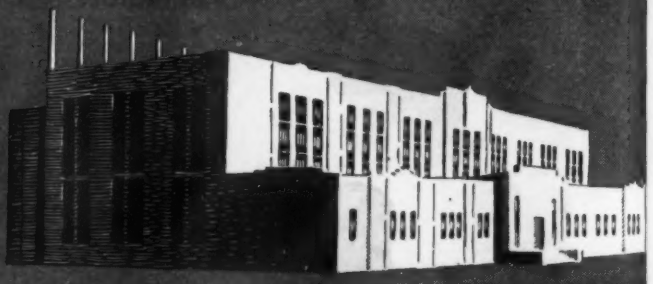
WHEREVER THERE IS

# MANUFACTURING

WHEREVER

# POWER

IS NEEDED ON LAND



**PRODUCERS OF HAMILTON-DIESELS, STEAM ENGINES AND MACHINE TOOLS**

GENERAL MACHINERY CORPORATION

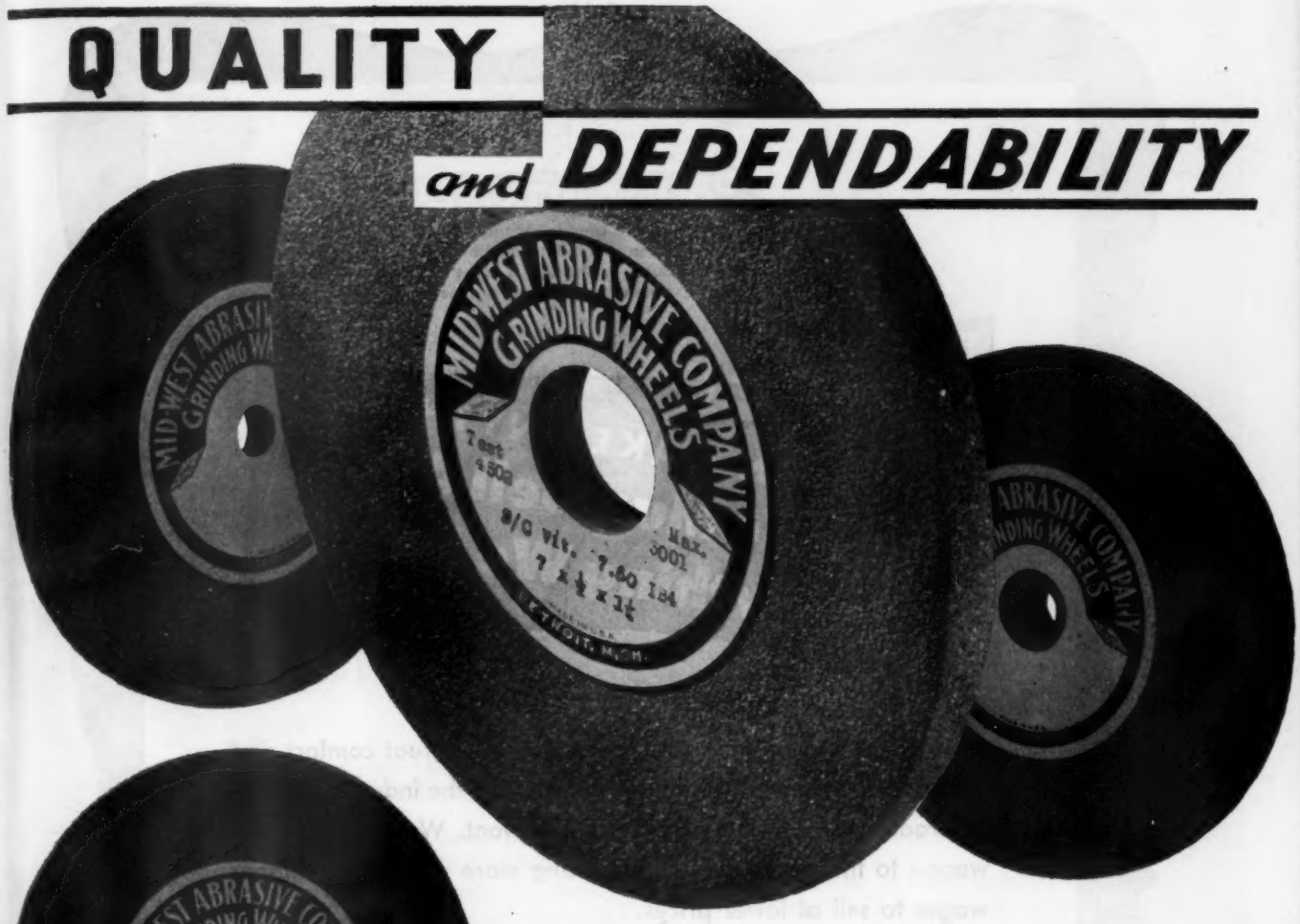
## *Wherever They Are Needed*

**GENERAL MACHINERY CORPORATION**

**HAMILTON, OHIO**

THE NILES TOOL WORKS CO. • THE HOOVEN, OWENS, RENTSCHLER CO. • GENERAL MACHINERY ORDNANCE CORPORATION

# QUALITY *and* DEPENDABILITY




● **Engineered quality and dependability of performance are the hallmarks of products of the Mid-West Abrasive Company.**

**Mid-West's outstandingly successful tool room grinding wheel, and every other product of the broad Mid-West line—honing stones, sharpening stones, coated abrasives, disks and wheel dressers—all must bear these two hallmarks.**

**Let quality and dependability guide you in your choice of abrasives, and we feel certain that choice will be Mid-West. Prompt delivery on all items.**

**MID-WEST ABRASIVE CO.**

*Manufacturers of DEPENDABLE Abrasives · Owosso, Mich. · Detroit · Rochester, Pa.*

DISTRIBUTION
When production overbalances distribution, when we fail to distribute what we can produce, production is throttled, jobs are fewer, standards of living decline.
PRODUCTION

# WE CAN MAKE ANYTHING ...We Must Sell All of Everything We Make

For a long time we in America have derived great comfort and assurance from the knowledge that we have the industrial ability to produce anything we may need or want. We have tied our wagon to the bright star of producing more products at higher wages to sell at lower prices.

This concept of production has brought us the largest expansion in a standard of living of any people in history.

But, while we have always been able to make anything, we have not always been able to sell all of everything we could make. We have not devoted the same enterprising energy to expanding distribution that we have to production. So, in the past, for immediate short swing relief we have resorted to government imposed restrictions on production and distribution. This expedient did not bring worth-while relief, for in the end it added up to fewer jobs, less production—higher prices.

If commerce and industry will use its inspirational ability and ingenuity to find better, cheaper methods of distribution per unit our goal of full employment may easily be accomplished and we can return to the enviable position of enjoying an expanding standard of living.

**MICROMATIC HONE CORPORATION**
**DETROIT 4, MICHIGAN**

MODEL 705

# THESE MACHINES HAVE HELPED BRING VAST IMPROVEMENT IN WAR "DISTRIBUTION" VEHICLES . . . . . .

## ...they will do THE SAME for Distribution in Peacetime

MODEL 702

While cost is a secondary consideration in distribution of war materials, other needs parallel peacetime distribution. Lighter, more easily operated equipment—higher pay loads—easier maintenance, and less of it—are all vital. Micromatic Honing machines have helped wartime distribution to these goals—will do the same for industry after the war. At the same time they will help lower initial and operating costs of distribution machinery—lower costs of goods delivered.

### MODEL 705

### VERTICAL HYDROHONER

Micromatic Model 705 Multiple Spindle Vertical Hydrohoner has built-in automatic Microsize Control which gauges work automatically—holds within tolerance of .0001" for geometric accuracy and .0003" for *uniform diameter size*—automatically stops honing cycle when correct size is reached. For internal honing or bores ¼" to 2" diameter. Rotary indexing work fixture provides high production. Usually recommended for maximum stock removal ranging from .0005" to .0015" on hardened parts—.001" to .010" on soft or medium hard. (Illustrated above, left).

Precision sphericity without measurable error is generated on ball studs by the Micromatic Ball Stud Honer.

Removes .030" stock on diameter from turned heat treated forgings.

Precision honing of long pieces—external or internal—is the work of the Micromatic Horizontal Floor Type Honer. Either hydraulic or manual control or tools. Set-ups available to generate either cross-hatch or co-directional finish patterns.

### MODEL 702 Single Spindle Type HYDROHONER

Single Spindle Type Micromatic Hydrohoner Model 702 for rapid production honing of bores or cylindrical surfaces up to 2" in diameter. (Illustrated above, right).

Silver plated bearings are production honed on a Micromatic Horizontal. Costs were reduced 50% from previous methods.

## MICROMATIC HONE CORPORATION

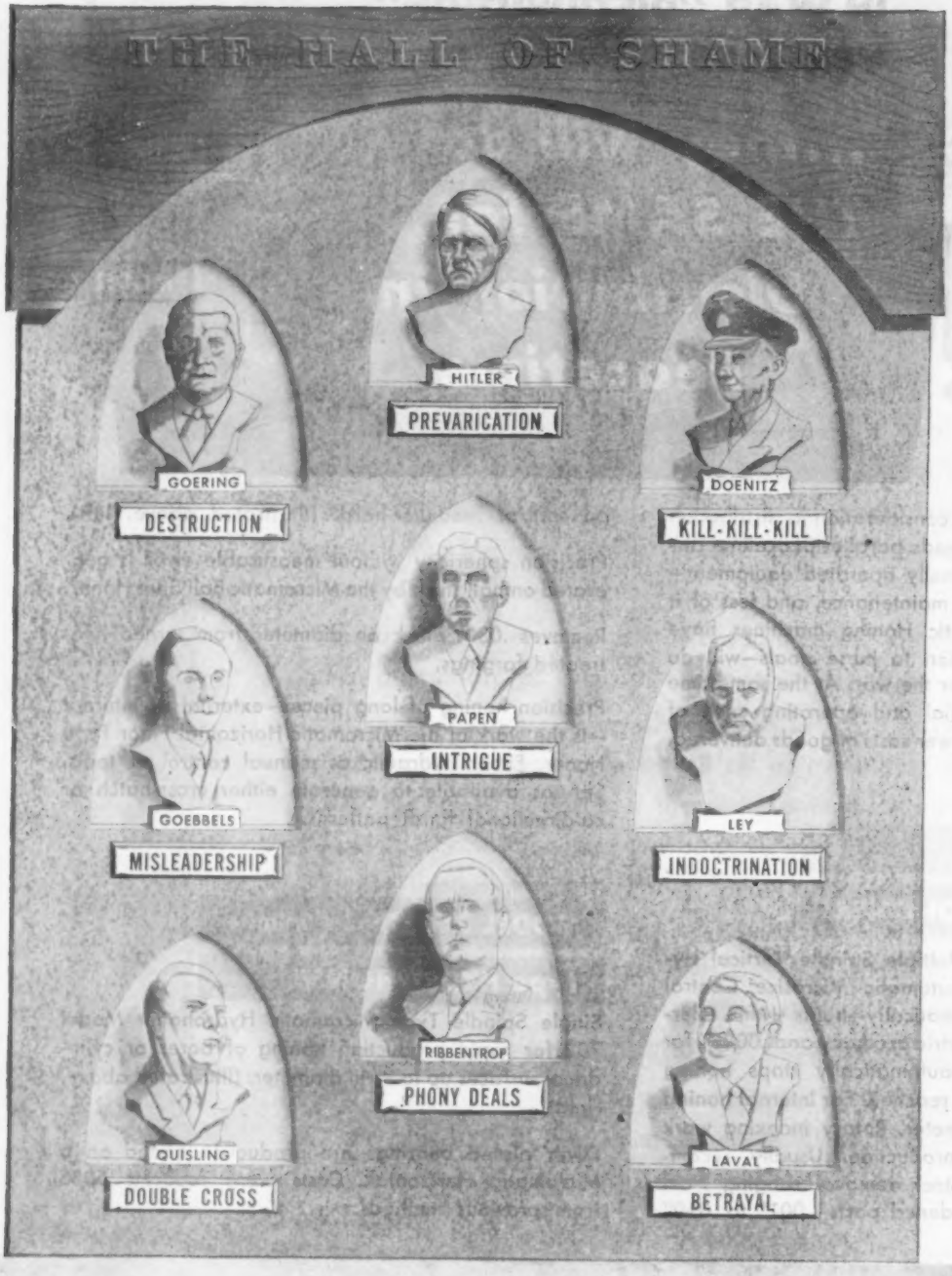
DETROIT 4, MICHIGAN

DISTRICT OFFICES: 614 Empire Building, 206 South Main Street, Rockford, Illinois • 129 Church Street, New Haven 10, Connecticut
501 Harries Building, 137 North Main Street, Dayton, Ohio • 1031 South Broadway, Los Angeles 15, California

MAKERS OF HONING MACHINE TOOLS

*then they said to themselves*

# Boy!—did we build a business?




Recommended for niches in the Hall of Shame are the leaders of the House of Heil.

—All ideologists of the New Day.

—All fluent of tongue.

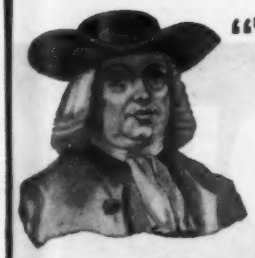
—All uttering words to dissuade men from honorable business tactics.

So their flourishing business came to the end of the road.

—recalling again the truth in the business advice of William Penn:

## "False dealing travels a short road...true worth is inevitably discovered."

Timely precept, that. Many businesses will discover the true worth of techniques and equipment used in defeating the House of Heil . . . such as . . .

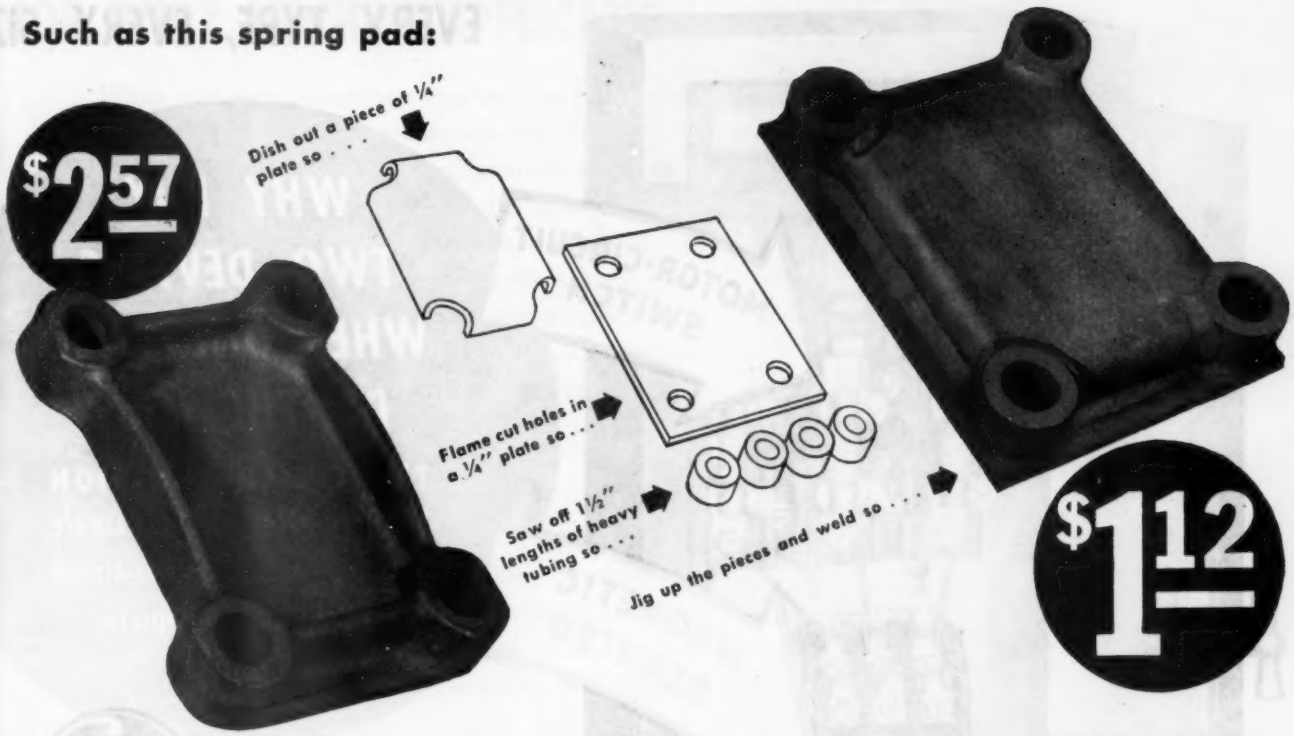


# "True Worth is Inevitably Discovered" *he says*

***LOOK,*** how to discover the true worth of welded design for your products:

## To discover LOWER COSTS and BETTER PRODUCTS *change one part at a time* to WELDED DESIGN

**Such as this spring pad:**


$2.57
Dish out a piece of ¼" plate so . . .
Flame cut holes in a ¼" plate so . . .
Saw off 1½" lengths of heavy tubing so . . .
Jig up the pieces and weld so . . .
$1.12

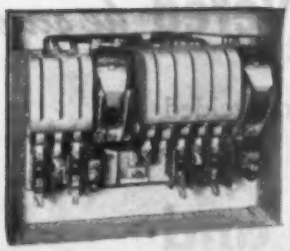
**CUTS WEIGHT FROM 18 LBS. TO 12 LBS.** *Saves* $1.45 *Each*

The Lincoln Engineer nearby will gladly help you explore *your* product to discover how you can cut its cost and improve its quality with welded design. Studies in Machine Design free on request. Ask for them on your business letterhead.

**THE LINCOLN ELECTRIC COMPANY • Dept. I-1 • CLEVELAND 1, OHIO**

*America's greatest natural* **recourse**

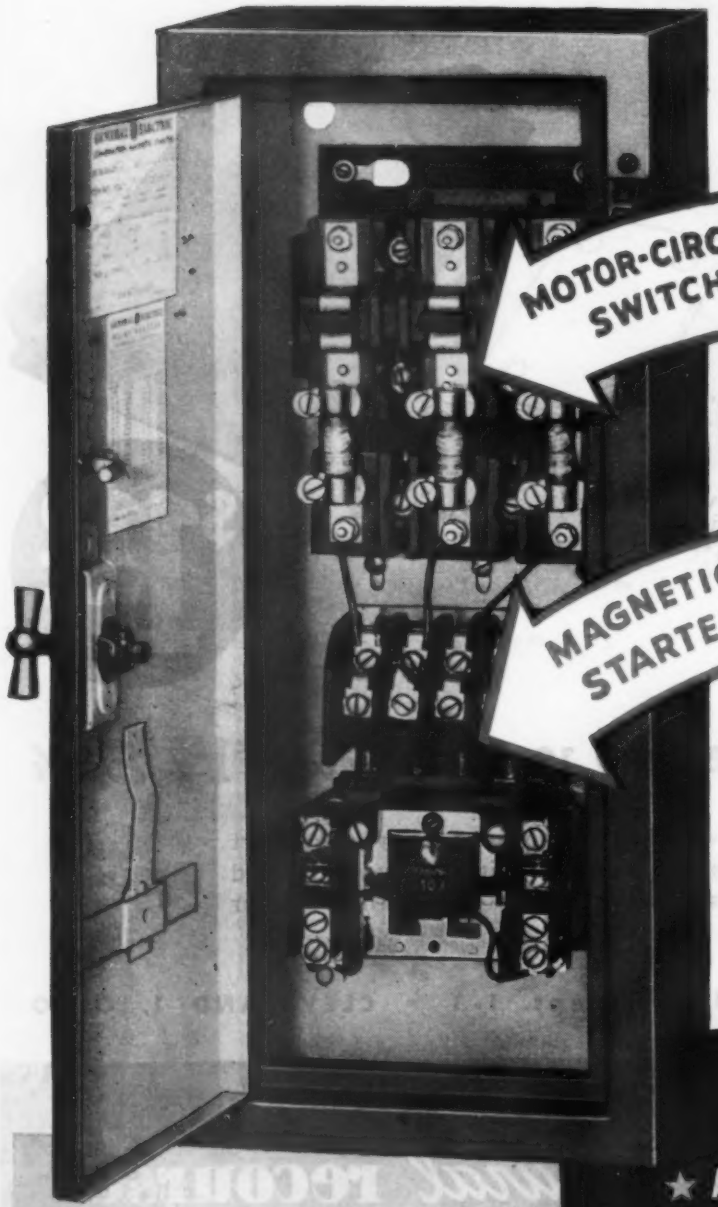
# ARC WELDING



*For frequent starting or remote control.* A full-voltage starter for two-speed squirrel-cage motors, and also available for starting three-speed or four-speed squirrel-cage motors. This particular switch provides dependable operation where motors are started frequently, and where remote control is desired—on pumps, blowers, ventilating fans, and machine-tools.

# MOTOR STARTERS

## EVERY TYPE, EVERY SIZE,




**WHY BUY TWO DEVICES WHEN ONE WILL DO THE JOB?**

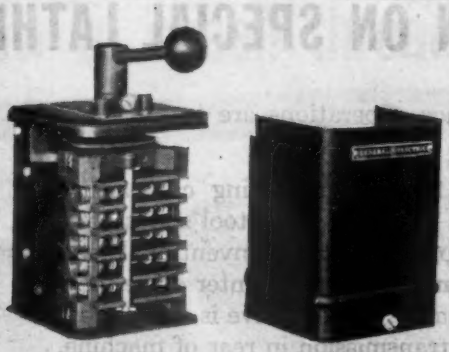
This G-E COMBINATION STARTER gives you in a *single* package both a motor-circuit switch and a magnetic starter.

GE

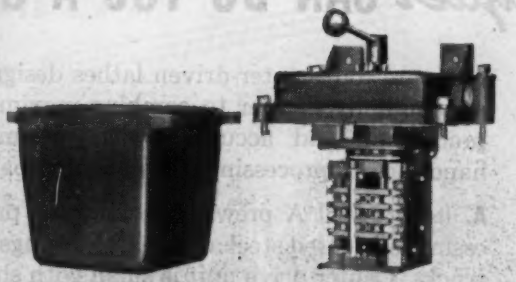
**INDUSTRIAL CONTROL**

★ DEPENDABLE
★ ATTRACTIVE IN APPEARANCE
★ DESIGNED TO BLEND WITH MODERN MACHINES

**For full-voltage starting of squirrel-cage a-c motors**



*Small size—general purpose.* Our small-size switch is cam-operated and spring-return to the off position. This particular device is recommended for single-speed reversing service or for two-speed non-reversing service.



*Small size—dust-tight and watertight.* The small size, too, comes in a variety of enclosures to meet different operating conditions. An example is this three-pole, reversing, rotating-cam switch in a watertight and dust-tight cast-iron case. It provides one point forward and one point reverse.

# FOR EVERY MACHINE APPLICATION

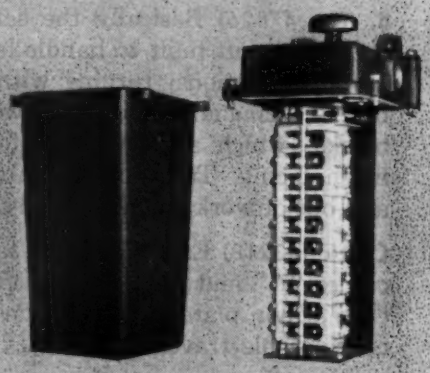
When you need motor starters, be sure to investigate G.E.'s complete line—perhaps some may give you important savings in time, space, or materials.

Take combination starters, for example—because you buy one packaged unit, less time is required for ordering and for installation. You can save space, too, by mounting them in small, unused spaces either near to or remote from the operator. And critical materials are conserved because these starters have less copper wire, steel conduit, and fittings than separately mounted devices.

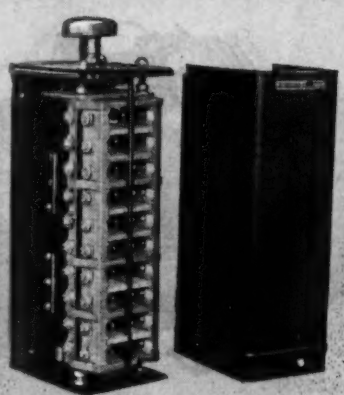
Also shown here are other G-E starters—leaders in their field. They range from a general-purpose type of rotating cam switch to a full-voltage, multispeed magnetic starter. Frequent starting, remote control, different starting speeds, and many other special requirements can be obtained by selecting one of these starters.

And all G-E starters come in a variety of enclosures designed to meet different operating conditions.

We'd like to send you any additional information you may want. And remember, our engineers will be glad to assist you in selecting exactly the right starter for your needs. Get in touch with your local G-E office today. Or if you prefer, write directly to General Electric Company, Schenectady 5, N. Y.



*Multispeed—dust-tight and watertight.* Rotating-cam switches come in enclosures to meet your needs. Here is a reversing, multispeed, rotating-cam switch in a watertight and dust-tight cast-iron case. This switch provides four speeds forward and one speed reverse.



*Multispeed—general purpose.* This general-purpose type of rotating-cam switch is available for single-, two-, three-, or four-speed motors requiring forward and/or reversing service. Particular care has been taken to assure you of obtaining the long-lived service that you want in a switch.

**GENERAL ELECTRIC**

676-127-5910

Buy all the BONDS you can—*and keep all you buy*

# *Snyder* CAN DO YOU A GOOD TURN ON SPECIAL LATHES

Here are four center-driven lathes designed and built by Snyder to combine maximum production and accuracy with minimum handling in processing large heavy parts.

**A.** (No. 42595) A prewar machine for processing fabricated steel axle shaft housings for trucks. Center drive unit is small with short rear center movement actuated by air cylinders. Tail stock housing is rigidly mounted. Operations; turning various diameters near the wheel ends of the housing and facing numerous shoulders and flanges.

**B.** (No. 47826) Basically the same as Machine "A" but built to handle heavier, cast parts. Operations; turning with front tool blocks, facing and shouldering with rear tool blocks—which are reversible for rough or finish facing. Tail stop assembly slides in and out of work as an assembly.

**C.** (No. 43218) Essentially the same as Machines "A" and "B" but built to handle a cast armor plate rotor and designed with considerable travel of tail stock to provide loading space. Operations are turning and facing from both ends.

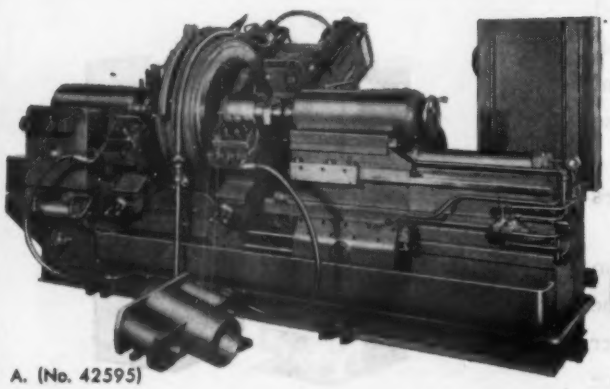
**D.** (No. 51113) For processing cast armor plate recoil housings. Rear tool slides have extremely long travel and conventional head stock and motor drive to center drive have been eliminated. Center drive is direct from motor and transmission in rear of machine. Operations; turning with front tool blocks and facing and shouldering with rear tool blocks.

All of these lathes are hydraulically operated and electrically controlled and operate on an automatic work cycle. The scope of operations and variety of parts indicate the versatility and flexibility of this type of Snyder special-purpose machine.

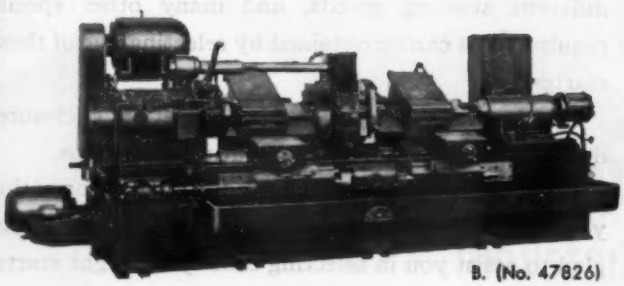
If you are interested in accurate cost-control in any metal-cutting operation, we invite your inquiries. *Snyder Tool & Engineering Company, 3400 E. Lafayette Avenue, Detroit 7, Michigan.*

**20 Years of Successful Cooperation with Leading American Industries**

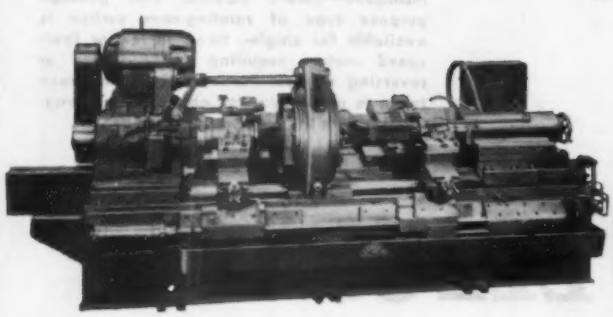
**SNYDER**
DESIGNERS AND BUILDERS OF MACHINERY FOR HIGH PRODUCTION AT LOW UNIT COST



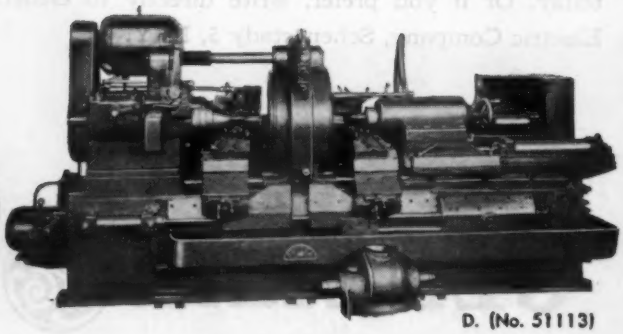
A. (No. 42595)



B. (No. 47826)

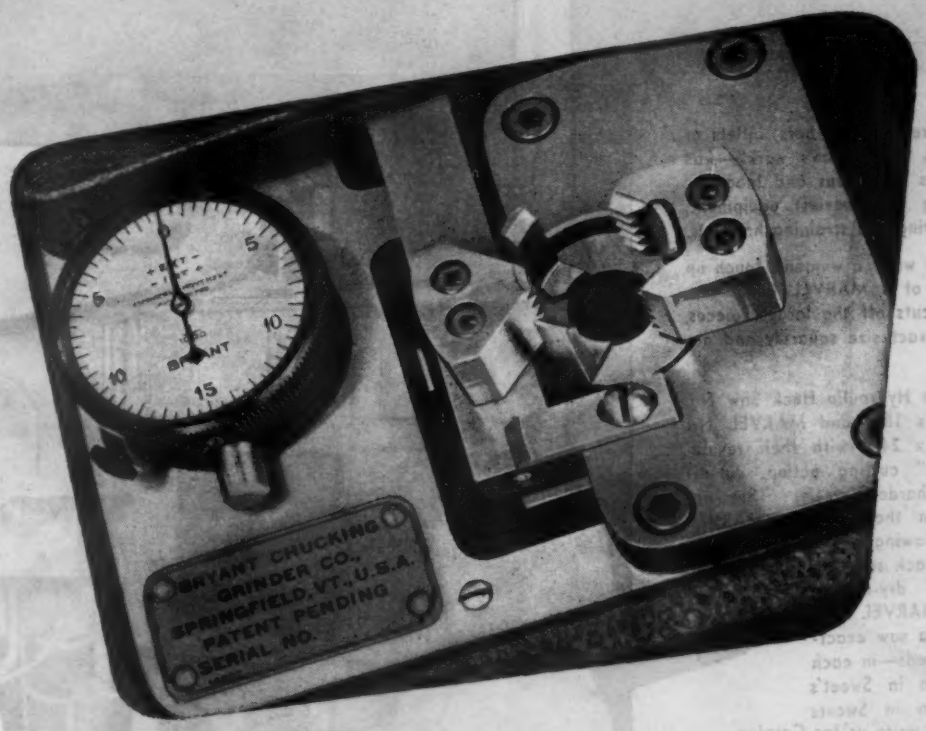


C. (No. 43218)



D. (No. 51113)

# How to speed thread inspection . . .




## *Bryant Thread Gages*

☆ This new Bryant Thread Gage Catalog describes all the advantages of these unusual gages . . . it tells how you can inspect internally and externally threaded parts four or five times faster . . . it tells how threaded parts can be inspected all over in a matter of seconds . . . it describes and illustrates three standard and one special model for work from 3/8" to 8" internal and 3/16" to 8" external. A free copy is yours for the asking!

send the coupon

**BRYANT**

**CHUCKING GRINDER CO.**

SPRINGFIELD, VERMONT, U. S. A.

**BRYANT CHUCKING GRINDER CO.**
**Springfield, Vermont, U. S. A.**

**Please send me Catalog No. G3 which gives complete details on the Bryant Thread Gages**

NAME_____ TITLE_____

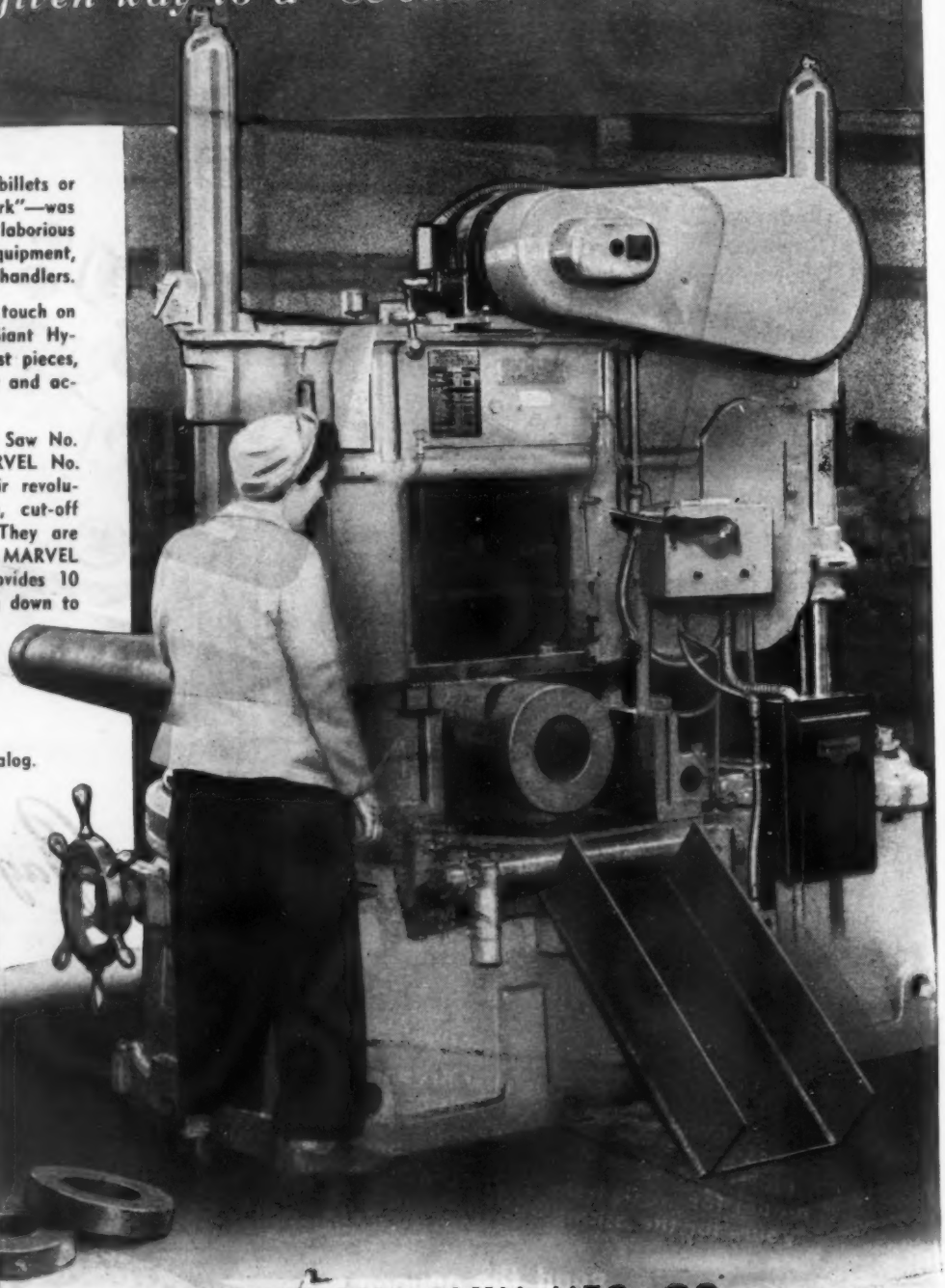
COMPANY_____

STREET_____

CITY_____ STATE_____

# THE SINEWS OF THE ARMORER

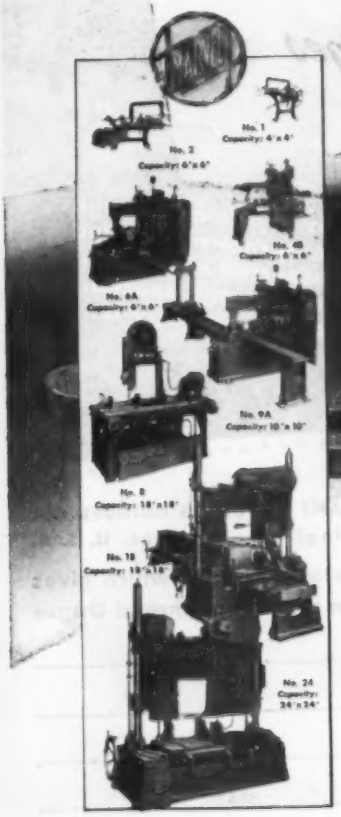
## *have given way to a Woman's Touch*



The cutting-off of really large bars, billets or forgings has always been "man's work"—was a slow, costly series of tedious and laborious operations requiring the heaviest equipment, and a crew of sweating and straining handlers.

How different today when a woman's touch on the control button of a MARVEL Giant Hydraulic Hack Saw cuts off the largest pieces, and cuts each to exact size squarely and accurately.

The MARVEL Giant Hydraulic Hack Saw No. 18, capacity (18" x 18") and MARVEL No. 24, capacity (24" x 24") with their revolutionary "roll-stroke" cutting action, cut-off the toughest and hardest steels. They are the larger units in the complete MARVEL System of Metal Sawing, which provides 10 different types of hack saws ranging down to small economical dry-cutting shop saws. In the MARVEL SYSTEM you will find a saw exactly suited to your needs—in each See full description in Sweet's See full description in Sweets Mechanical Files or write us for Catalog.




**ARMSTRONG-BLUM MFG. CO.**

*"The Hack Saw People"*

**5700 BLOOMINGDALE AVE.** **CHICAGO 39, U.S.A.**

*Eastern Sales Office: 225 Lafayette St., New York 12, N. Y.*

**MARVEL SAWS**

# *Imagine!*

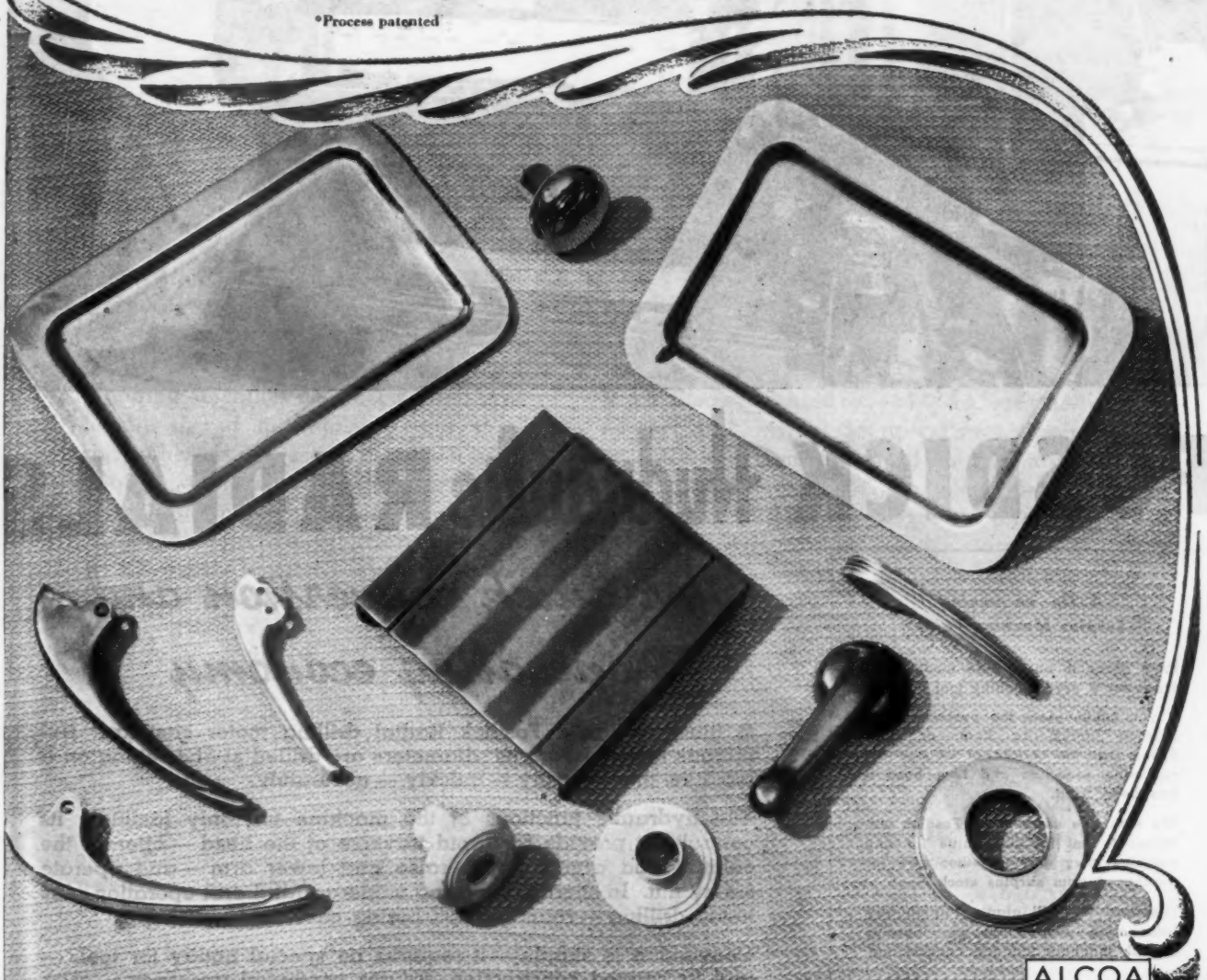
## THEY'RE ALUMINUM

Vanity cases and compacts, cigarette cases and lighters—Alumilite-finished* Alcoa Aluminum—had hit the sales counters before the war.

Since then new finishes have been developed such as electroplating on aluminum, which, in addition to adding to the range of colors available, also improves electrical and mechanical properties. These finishes open up new possibilities for products and accessories such as electrical appliances, household furnishings and automotive trim.

Ready now for these and other peacetime products are all of these finishes. Ask our finishing engineers for further details. ALUMINUM COMPANY OF AMERICA, 2107 Gulf Building, Pittsburgh 19, Penna.

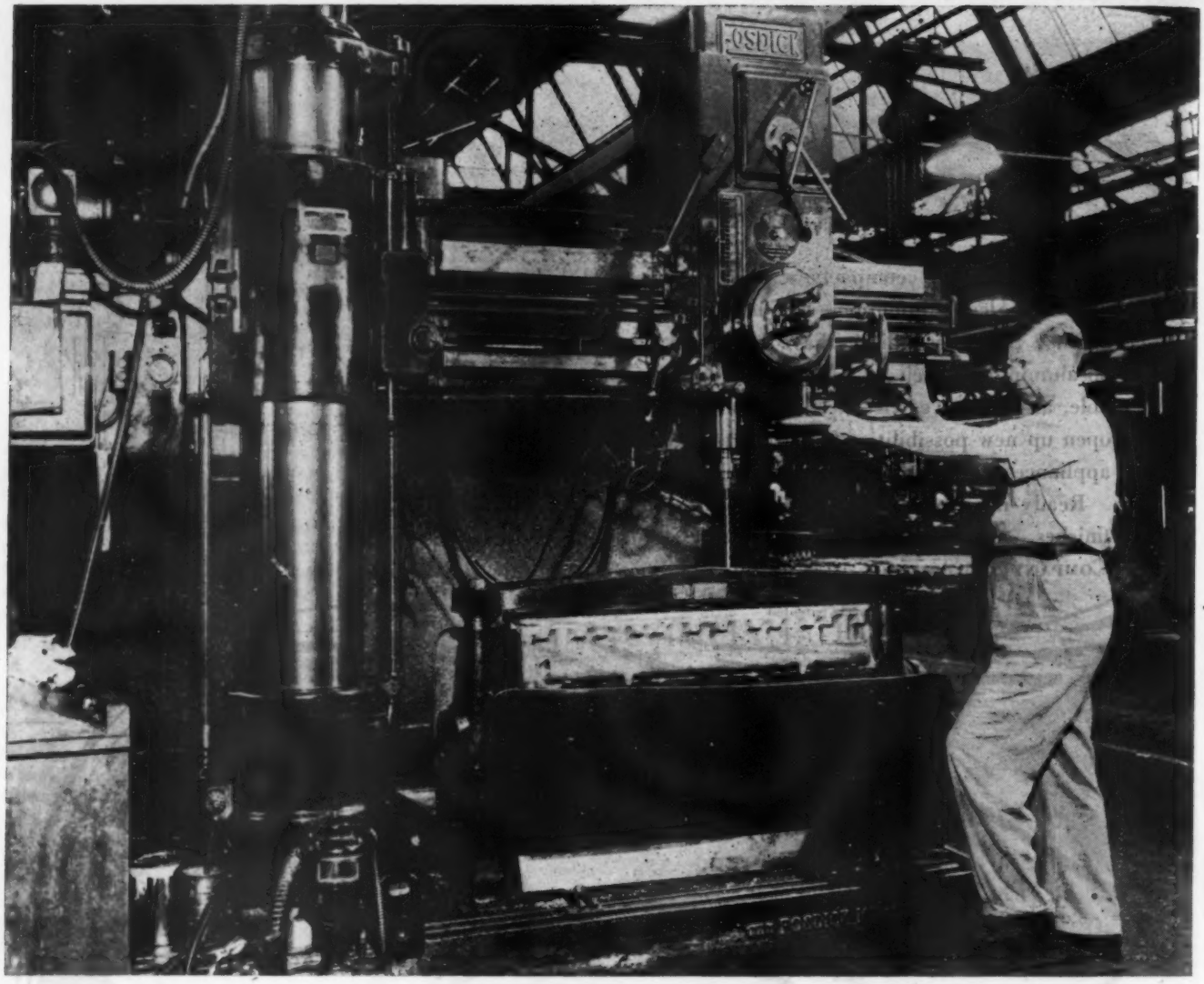
*Process patented



FIRST IN

# ALCOA ALUMINUM

ALCOA ALUMINUM




# FOSDICK Hydraulic RADIALS

## *for quick conversion and operating economy*

**A tip on buying Surplus Machine Tools**

Price alone is not a safe measure of value for a used machine tool.

If you contemplate the purchase of a Fosdick Radial—Jig Borer—or High Speed Drill be certain of its age—its operating condition and how hard it has been used.

We want the users of all Fosdick Machines to get the full value for any machine they buy whether new or purchased from surplus stock.

Therefore we will gladly furnish any information desired on any Surplus Fosdick machine you are considering.

● Illustrated is a Fosdick Radial drilling motor castings. Numerous holes of various diameters are drilled at one setting on a job like this — easily — quickly — accurately.

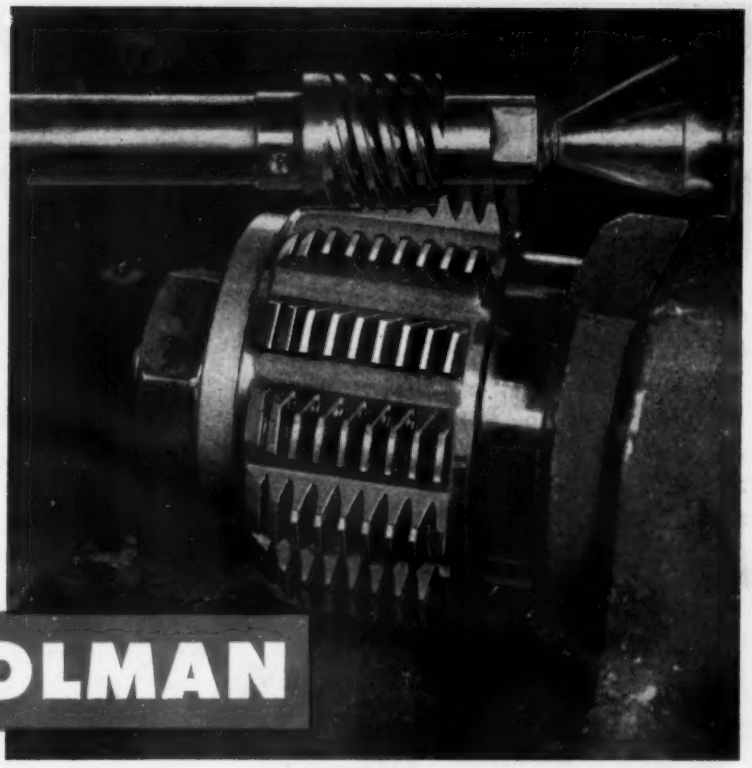
The hydraulic functions of the machine not only facilitate its control but provide for rapid traverse of the head — operate the column and arm clamp — raise and lower arm — and operate safety nut. In short it will bring modern radial drill operation plus lower drilling — reaming and boring costs to your shop.

Conversion is simple — it requires no special outlay for tools — and its rugged construction assures continued accuracy.

**FOSDICK MACHINE TOOL COMPANY**
**CINCINNATI 23, ··· OHIO**

Stainless steel 4-thread worm which is generated on a Barber-Colman No. 3 Hobbing Machine to close tolerances and fine finish.

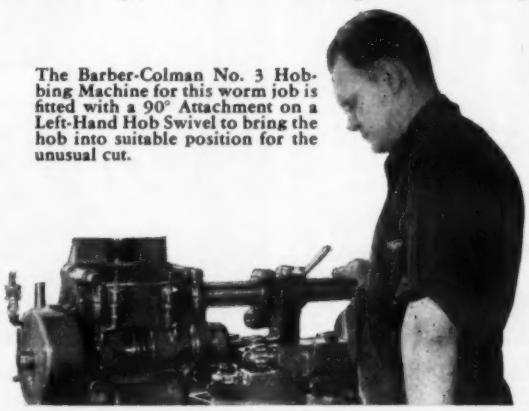
PATENTS MAKE JOBS



# BARBER-COLMAN

## NO. 3 HOBBING MACHINE HOBS 4-THREAD STAINLESS STEEL WORM WITH FINE FINISH

In a number of instances Barber-Colman Hobbing Machines have been engineered to handle thread milling jobs, but the job shown here is interesting because it involves hobbing 4 threads to extremely close accuracy and fine finish requirements, at a fairly high rate of production. The job is set up on the machine so as to generate, in effect, a four-tooth helical gear of extremely high helix angle. The piece is a 4-thread worm .694/.696″ O.D., ¾″ face, 24 D. P., 15° 44″ helix angle, made of stainless steel with a Brinell hardness of 202. Finished pieces are checked against a master gear and must have *zero backlash.* Pitch diameter is held to .613/.615″ measured over .072″ wires. Set up calls for a hob speed of 133 r.p.m. and a feed per revolution of the work of .0054″ (for fine finish). This results in a cutting time of 10 minutes per piece, which is very satisfactory considering the accuracy and finish required. The hob produces 200 pieces per sharpening in this hard and tough steel. *Barber-Colman engineers are ready to help you achieve similarly fine results on difficult manufacturing operations.* For improved, low-cost hobbing methods, consult your B-C representative.



The Barber-Colman No. 3 Hobbing Machine for this worm job is fitted with a 90° Attachment on a Left-Hand Hob Swivel to bring the hob into suitable position for the unusual cut.

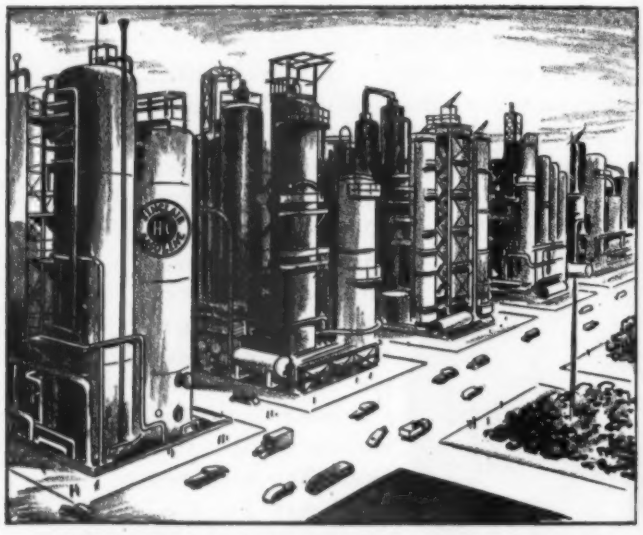
# BARBER-COLMAN COMPANY

HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

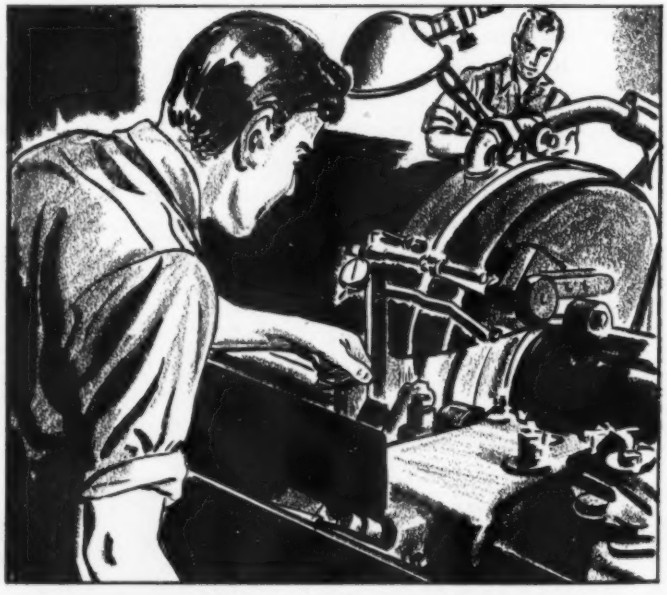
GENERAL OFFICES AND PLANT • 111 LOOMIS STREET • ROCKFORD, ILLINOIS, U.S.A.

# Do you know that . . .

A LINE OF DRUMS END TO END LONG ENOUGH TO REACH TWICE AROUND THE EARTH WOULD BE REQUIRED TO HOLD THE BILLIONS OF GALLONS OF SINCLAIR FUEL AND LUBRICANTS SOLD LAST YEAR.



SINCLAIR REFINERIES HAVE MANUFACTURED MILLIONS OF BARRELS OF 100-OCTANE GASOLINE FOR THE ARMED FORCES. SINCLAIR AVIATION GASOLINE WILL AID FLYING ON NATIONAL AND INTERNATIONAL ROUTES.



FOR FASTER MACHINING, FINER FINISH, AND LOWEST COST PER UNIT MACHINED—SINCLAIR PROVIDES DIVERSIFIED CUTTING OILS SUITED TO ALL TYPES OF METALS... ALSO SPECIALIZED LUBRICANTS FOR BETTER MAINTENANCE OF EQUIPMENT.

**SINCLAIR** IS EQUIPPED TO SERVE YOU BETTER!

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

# MECHANIZED *Flow* OF MATERIALS

AUTOMATIC TRANSPORTER
MOTORIZED HAND TRUCK

AUTOMATIC FORK TRUCK

## *Gives you* LOWER UNIT COSTS . . .

Management is now *compelled by competition* to utilize men, methods, materials and machines in a manner *to achieve lowest production cost and sales price per unit.*

While processing motions usually add value to a product, *handling motions add only to its cost.*

You can lower your unit costs if you will team up AUTOMATIC's battery-powered Fork Truck with the war-tested "TRANSPORTER," AUTOMATIC's *service-proved,* motorized hand truck,—and apply AUTOMATIC's Engineered Materials Handling Methods.

AUTOMATIC's completely Engineered Materials Handling Service will do these things for you:

1. *Eliminate* costly manual handling.
2. *Reduce damage* to materials handled.
3. *Increase storage capacity* by safe, vertical stacking of materials to rooftop.
4. *Simplify inventory* control.
5. *Increase productivity* by reducing labor fatigue.
6. *Reduce accidents.*

*Please write us now* so we may schedule your plant for the next AUTOMATIC Engineered Materials Handling survey in your area.

*Free Service*

**AUTOMATIC has 100 Materials Handling Engineers in the field. There's one near *your* plant. He is ready to help you analyze your operations from receipt of raw materials through each successive handling procedure to storage and final shipment.**

***Please write us now* so we may schedule your plant for the next AUTOMATIC Engineered Materials Handling survey in your area.**

MANUFACTURERS OF *Electric* INDUSTRIAL TRUCKS SINCE 1906

**AUTOMATIC TRANSPORTATION COMPANY**

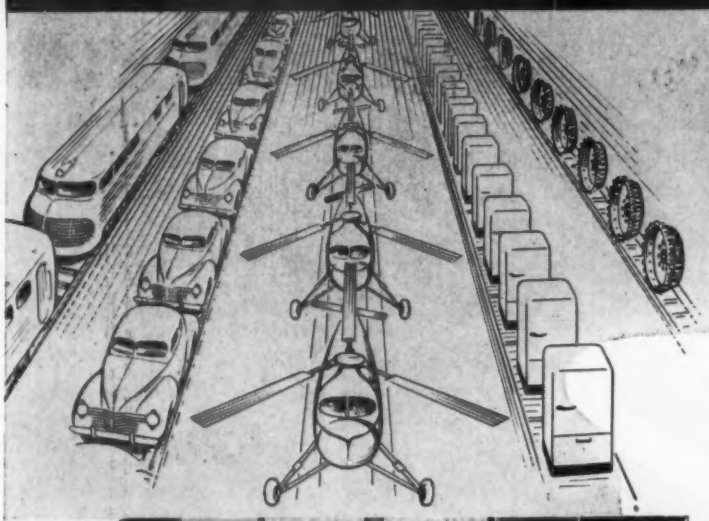
*Division of the Yale & Towne Manufacturing Company*

59 West 87th Street Chicago 20, Ill. U.S.A.

***Specialists in developing* ENGINEERED MATERIALS HANDLING TO LOWER UNIT COSTS**

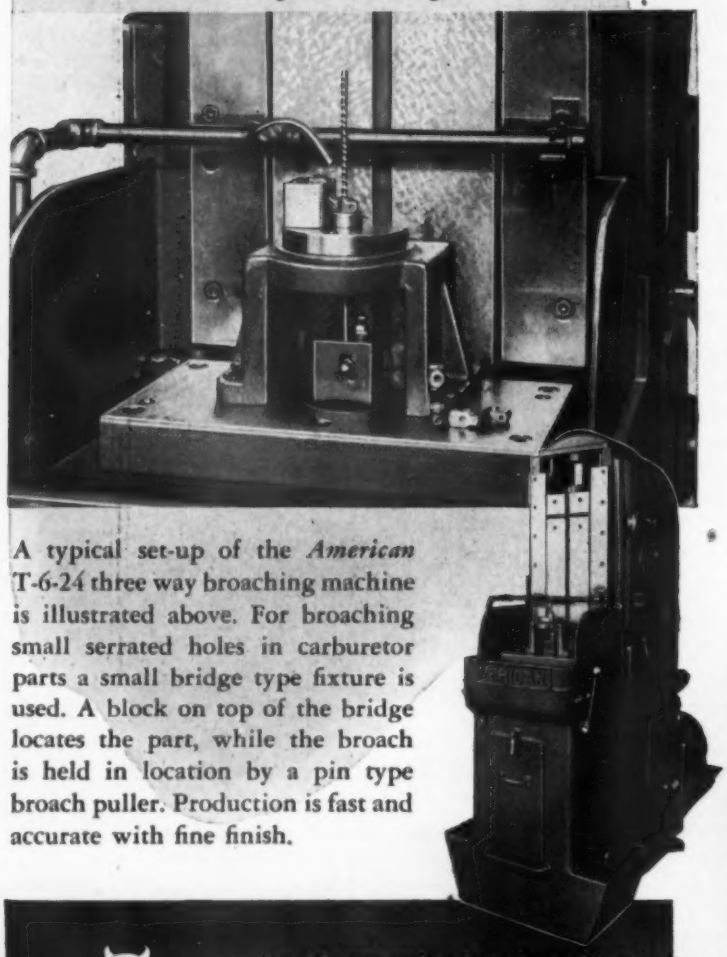
# MAKE RECONVERSION EASIER

## with Broaching by *American*



Standard equipment, capable of performing a wide variety of different tasks, can naturally eliminate many of reconversion's headaches. Standard *American* broaching machines, designed with this basic fact in mind, are made for maximum flexibility. That is why manufacturers in many industries turn to broaching by *American* to perform their metal finishing jobs.

*American* offers a complete broaching service—machines, tools, and engineering. *American* engineers will gladly recommend the correct standard equipment for your job, or, if necessary, design special machinery to meet your requirements. For further details, write *American* today. There is no obligation.



A typical set-up of the *American* T-6-24 three way broaching machine is illustrated above. For broaching small serrated holes in carburetor parts a small bridge type fixture is used. A block on top of the bridge locates the part, while the broach is held in location by a pin type broach puller. Production is fast and accurate with fine finish.

Avoid excess load on broaching tools. Do not attempt to broach parts that are improperly prepared.

MEMBER BROACHING TOOL INSTITUTE

*American*

**BROACH AND MACHINE CO.**

ANN ARBOR, MICHIGAN

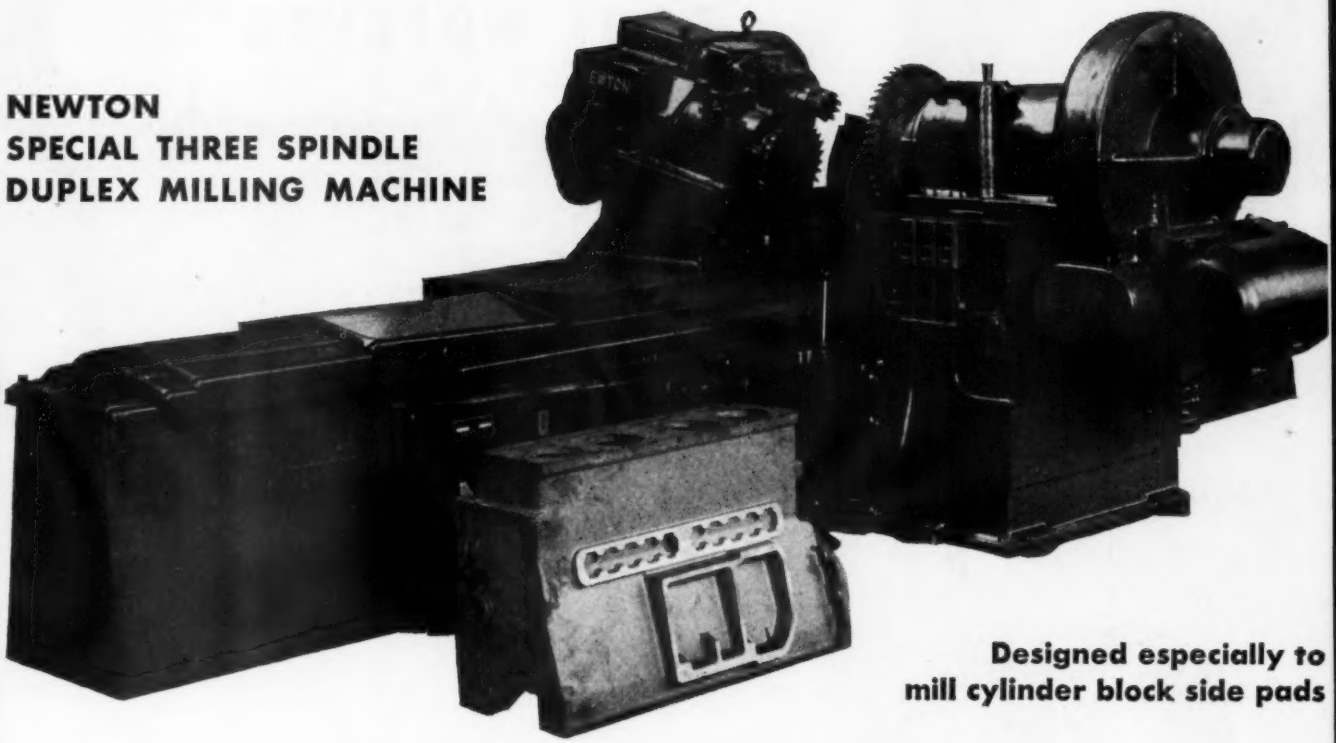
•

BROACHING MACHINES
PRESSES
BROACHING TOOLS
SPECIAL MACHINERY

DIVISION OF SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILL.

# Production cost can determine your position in your industry

**NEWTON**
**SPECIAL THREE SPINDLE**
**DUPLEX MILLING MACHINE**



**Designed especially to mill cylinder block side pads**

Among Heavy Machine Tools built by Consolidated are . . .

LATHES
BORING MILLS
DRILL PRESSES
MILLING MACHINES
BORING MACHINES
PLANERS
SLOTTERS
RAILROAD SHOP TOOLS
AUTOMOTIVE TOOLS
AND OTHER
SPECIAL MACHINES

To maintain their prewar position in the intensive completion of tomorrow's reconversion era, manufacturers will need, among other things, the most efficient machine tools available.

The machine shown here is but one example of Consolidated Machines designed and built as a means to newer, faster, and more economical production practices.

Consolidated engineers, with years of experience in designing special machines for special work, are always at your service.

**BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1861**

BETTS • BETTS-BRIDGEFORD • NEWTON • COLBURN • HILLES & JONES • MODERN

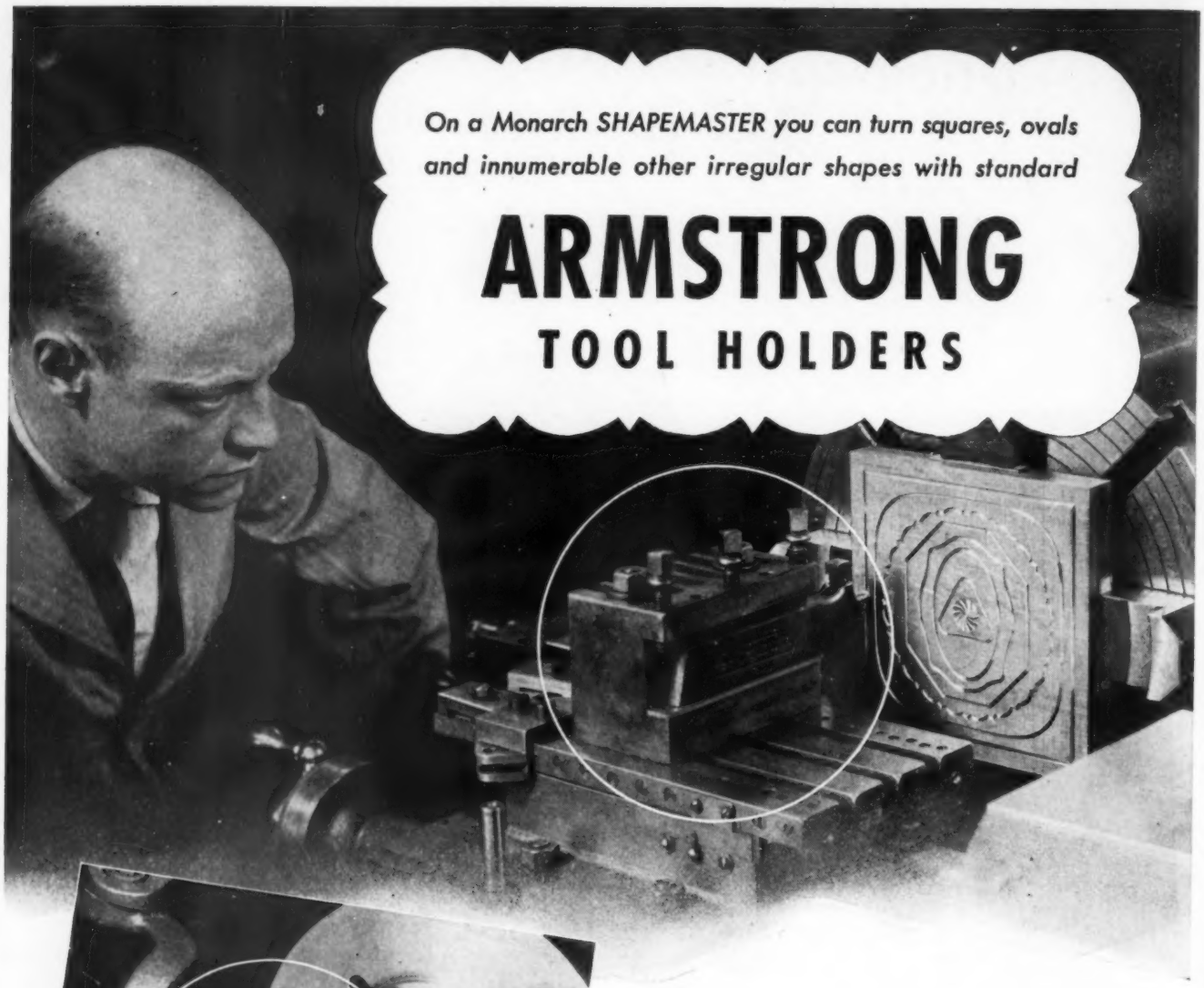
CONSOLIDATED MACHINE TOOLS

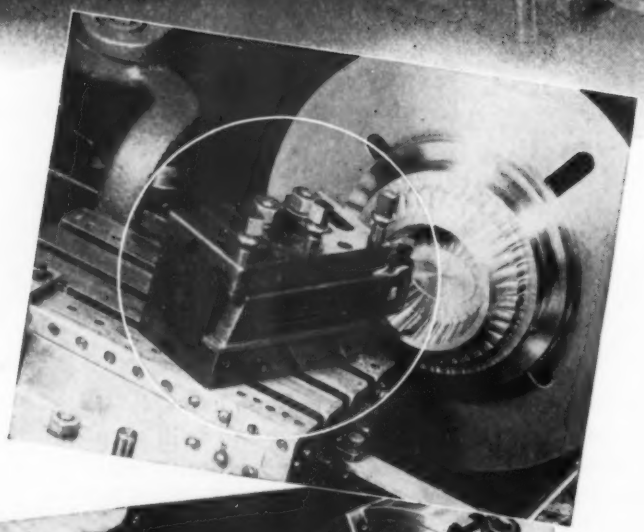
# CONSOLIDATED
## MACHINE TOOL CORPORATION

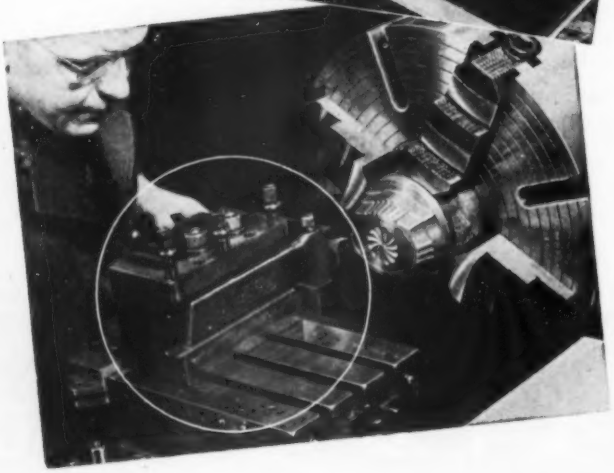
ROCHESTER 10, NEW YORK

*On a Monarch SHAPEMASTER you can turn squares, ovals and innumerable other irregular shapes with standard*

# ARMSTRONG
## TOOL HOLDERS







The phenomenal Monarch SHAPEMASTER performs the most astonishing operations. Basically a 20" Monarch Lathe, when fitted with the SHAPEMASTER Mechanism, it will turn squares, ovals, hexagons, octagons and multiple sided shapes in irregular contour pieces. Almost any desired shape can be transmitted by the cutting point to either outside or inside diameter or face of the work.

The result of many years of engineering and development, the SHAPEMASTER is distinctly *modern* and advanced in its design in every detail. Still, for most of its unusual operations it is tooled with ARMSTRONG TOOL HOLDERS, of the standard types universally used on ordinary lathes in 96% of the machine shops and tool rooms.

These ARMSTRONG TOOL HOLDERS are selected not only because they "Save: All Forging, 70% Grinding and 90% High Speed Steel" but also because they have the strength to support the cutting edge rigidly not only against a normal down feed but against end thrust, side and torsional strain as well.

**ARMSTRONG BROS. TOOL CO.**
*"The Tool Holder People"*
315 N. Francisco Ave. Chicago 12, U.S.A.
*Eastern Sales Office & Whse.:*
199 Lafayette St., New York 12, N. Y.
*Pacific Coast Whse. and Sales Office:*
1275 Mission St., San Francisco 3, Calif.

*Specify* **Van Keuren**

# WIRE TYPE PLUG GAGES

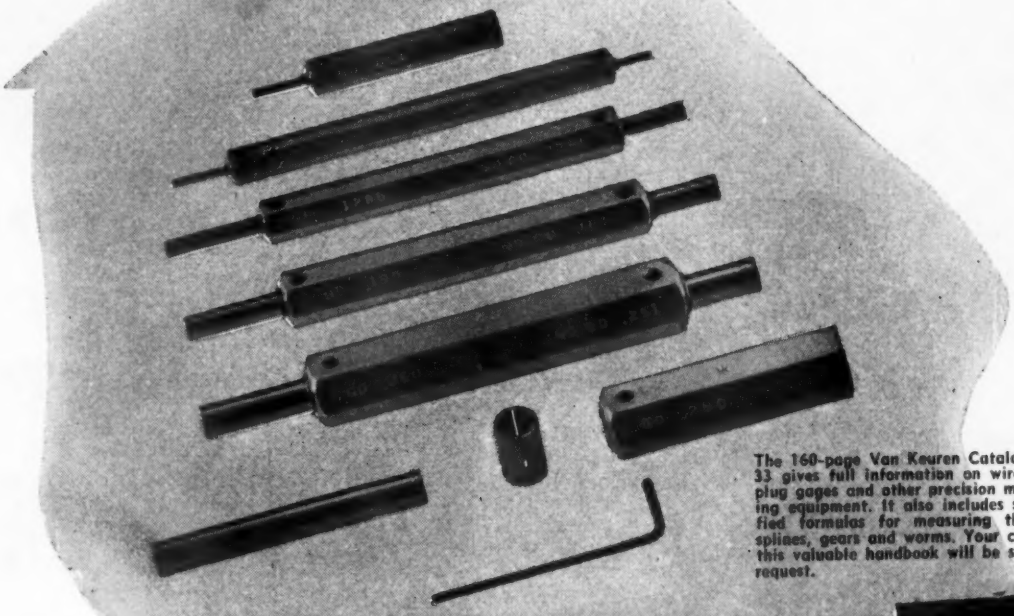
## . . . for gaging small holes

Wire type plug gages were originated by The Van Keuren Co. in 1925. They are now in almost universal use for gaging small holes.

Longer lasting precision and lower gage cost is assured because the entire 2" length of the gaging unit can be used. When the end becomes worn, it is ground off and a new section of the original accuracy is moved out for use. The wire unit is securely held in the handle by a split bushing and a headless set screw.

Van Keuren wire type gages are made to Class B accuracy, $+ .00005''$ $- .00000''$ on the Go units and $\pm .000025''$ on the No Go units. Closer or wider tolerances can be supplied if desired.

Our large stock of hardened and ground wire blanks insures prompt delivery—three to five days or within twenty-four hours in case of urgent need. Hard chromium-plated gaging units are recommended for use where the requirements are severe. They have three to five times the life of steel gaging units at only 25% additional cost and slightly longer delivery time.



The 160-page Van Keuren Catalog No. 33 gives full information on wire type plug gages and other precision measuring equipment. It also includes simplified formulas for measuring threads, splines, gears and worms. Your copy of this valuable handbook will be sent on request.

Wire Type Plug Gage Set No. 60. This set of gages provides accurate standards for checking twist drills in sizes from 1 to 60 (.228" to .040" diameter). A useful set of standard size gages. Price $375.00.

Van Keuren Wire Type Plug Gage Set No. 80 which includes drill sizes from No. 1 to 80 (.228" to .0135"), price $425.00.

**Van Keuren**

25th ANNIVERSARY

## He wants a JOB
## . . . and fast!

*The world's finest BORING and milling machine.*

*WRITE TODAY for your descriptive bulletin.*

## Create Jobs Faster by Speeding up your Reconversion Tooling

*with a*

## DeVlieg JIGMIL

**USERS** report two to three times the output with greatly improved accuracy as compared to other methods.

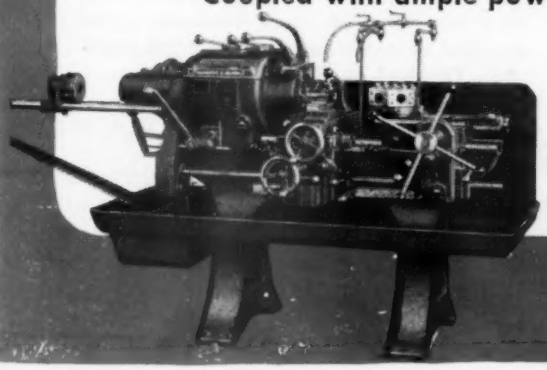
**AUTOMATIC PRECISION** . . . Automatic positioning between holes is controlled within less than one ten-thousandth part of an inch . . . feather touch pressure controlled slide locks positively control locking uniformity after positioning . . . all functions are responsive to the centralized finger tip control.

**DeVLIEG MACHINE COMPANY** DEVLIEG JIGMIL **450 FAIR AVE. FERNDALE 20, (Detroit) MICH.**

## because it handles so easily.

**A new (effortless yet powerful) hydraulic spindle brake enhances still further its long standing reputation as the EASIEST OPERATED AND MOST SENSITIVE UNIVERSAL TURRET LATHE.**

**Coupled with ample power, speed, rigidity, and efficient tooling, the important feature of ease of handling makes this machine an outstanding producer of small parts from bars, forgings or castings.**



**BARDONS & OLIVER, INC.**
**1133 WEST 9TH STREET CLEVELAND 13, OHIO**

# PRESSURE-TIGHT
# LEAK-PROOF
# VIBRATION-PROTECTED

The Parker Triple Type Fitting proved itself so efficient and economical that its principle was standardized for Army-Navy use on aircraft and ordnance.

The flared joint of this fitting provides maximum "tightness" without strain or tension on the tubing itself. It is fully protected against leakage under pressure, and is safe in conditions of extreme shock and vibration.

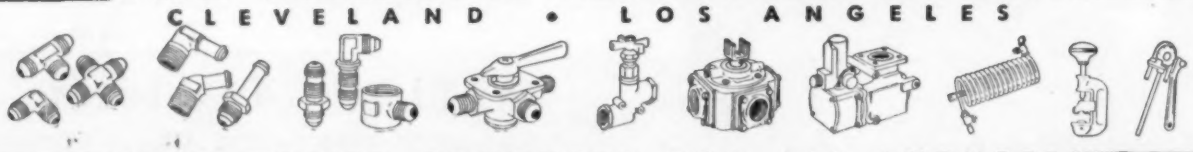
Parker systems provide streamlined flow, free from obstructions, and are easy to install and service, even in hard-to-get-at spots.

Production released by reduced military needs now permits you to use Parker fittings, in a wide variety of types, sizes and capacities, for power and fluid transmission systems.

**Immediate deliveries from Parker warehouses, or from your mill supply house. Information gladly furnished by Parker Appliance Co., 17325 Euclid Ave., Cleveland 12, Ohio.**

## THE PARKER APPLIANCE CO.

CLEVELAND • LOS ANGELES



**FLUID POWER PRODUCTS FOR ALL INDUSTRY**

# "With Gulf Lasupar Cutting Oil

## we increased tool life and greatly improved finish"— *says this Factory Manager*

Actual photo of Factory Manager consulting with Gulf Service Engineer (right) on results with Gulf Lasupar Cutting Oil in reaming 105 mm. gun tubes.

"When we used another type oil for reaming 105 mm. gun tubes, we experienced swelling of wood-packed reamers, and excessive heat." says this Factory Manager. "Gulf Lasupar Cutting Oil reduced temperatures to an efficient range and helped us secure increased tool life and much better finish."

As in this prominent ordnance plant, Gulf Lasupar Cutting Oil has set new standards of performance for tough jobs in hundreds of aircraft, armament, and munitions plants!

Gulf Lasupar Cutting Oil may be the answer to your tough, hard-to-speed-up machining operations—and to your requirements for an exceptionally fine finish on the work. Call in a Gulf Service Engineer today and let him demonstrate how this cutting oil can help you improve your machining practice.

Gulf Lasupar Cutting Oil—and the other quality cutting oils in Gulf's complete line—are available to you through 1200 warehouses located in 30 states from Maine to New Mexico. Write, wire, or phone your nearest Gulf office.

**GULF QUALITY CUTTING OILS**

**Gulf Lasupar Cutting Oils A, B, and C**
**Gulf Electro Cutting Oils A, B, and C**
**Gulf M-L Cutting Oils A, B, and C**
**Gulf Cut-Aid · Gulf Cutx B**
**Gulf L. S. Cutting Base A and B**

**GULF OIL CORPORATION · GULF REFINING COMPANY**

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Please send me, without obligation, a copy of the booklet, "Gulf Cutting Oils," which includes a helpful Machining Guide.

Name.....
Company.....
Title.....
Address.....

*Announcing the New*

**Model C** *Milwaukee*

# AUTOMETRIC BORING MACHINE

Advanced in every detail of operation and construction, this new machine is a real contribution to the art of precision boring. It offers initial high accuracy — design and construction to sustain this initial high accuracy throughout a long life — unexcelled simplicity, ease and convenience of operation.

Developed by Kearney & Trecker engineers to provide a superior, faster method of precision boring, the Model C Autometric embodies these "shop-tested" features:

- Column, bed and chip guard cast in one compact, sturdy unit — integral design.
- Rugged, compact, balanced construction with exceptionally low center of gravity — minimum vibration.
- Hardened, ground and lapped quill, saddle and table ways — for sustained accuracy.
- Large diameter quill with extra long bearing, sliding in a fixed headstock provides the total range of vertical movement — fewer moving parts.
- Rapid traverse to spindle quill is instantly available — speed and ease of operation.
- Direct measuring by Precision Screw Locating results in faster operation with no loose pieces to handle.
- Multiple V-belt drive direct to spindle at all speeds — smoother operation.
- Greater Speed Range — infinitely adjustable spindle speeds from 50 to 2500 rpm.
- Greater Feed Range — 8 boring feeds .0005 inch to .0148 inch per revolution of spindle.

In addition to these design features the Model C Milwaukee Autometric is unusually simple in operation; even an unskilled operator will quickly become familiar with this machine. An added feature is its cleanliness in operation — chip disposal being provided through the base of the machine.

The Model C Milwaukee Autometric will reduce your precision boring costs — get complete information — write for Catalog No. CMA10.

# KEARNEY & TRECKER

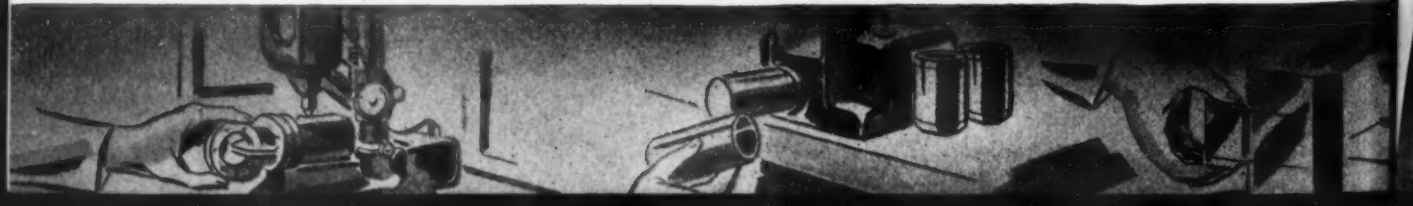
*Products*

**CORPORATION**

**Milwaukee 14, Wisconsin**

A Subsidiary of Kearney & Trecker Corporation

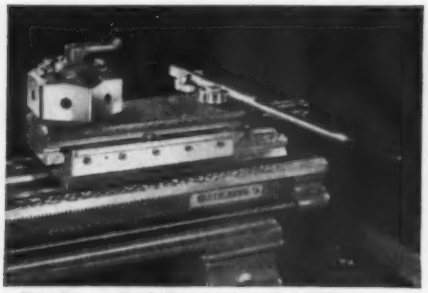
**Rotary Head Milling Machines • Midget Mill • Speed Mill • Face Mill Grinder • Autometric Boring Machine • Centerscope**



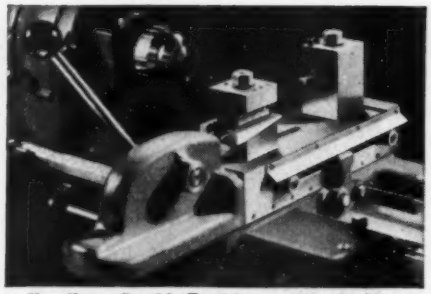
THE MOST MODERN MACHINE IN PRECISION BORING

# MORE VERSATILITY

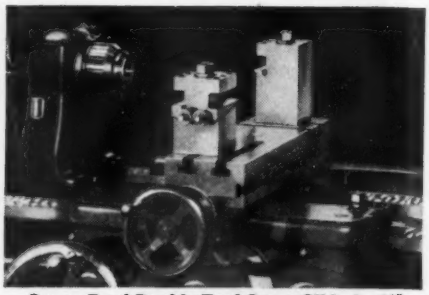
## FROM SOUTH BEND LATHES WITH THESE ATTACHMENTS



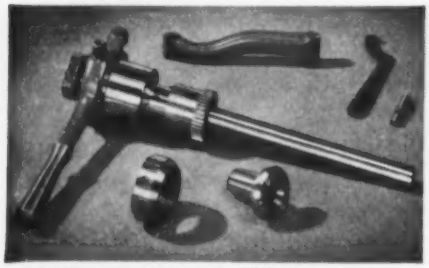
**Handlever Bed Turret** for 9" or 10" lathes multiplies their versatility through multiple tooling for repetitive operations.



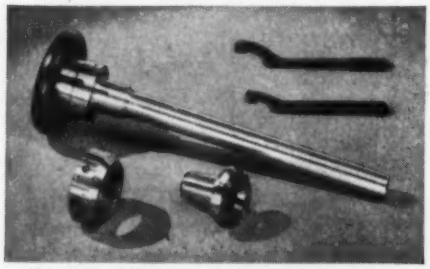
**Handlever Double Tool Cross Slide** for 9" or 10" lathes speeds up successive operations through the use of three cutting tools.



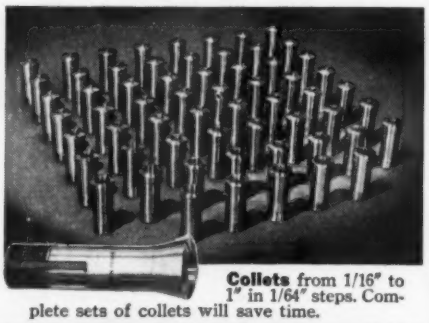
**Screw Feed Double Tool Cross Slide** for 16" lathes has both manual and power cross feed. Large graduated feed dial.



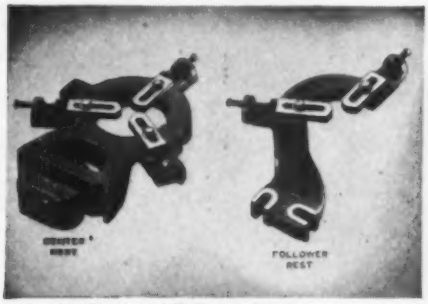
**Handlever Draw-in Collet Attachment** saves time on bar work. Collet can be operated and stock fed without stopping the spindle.



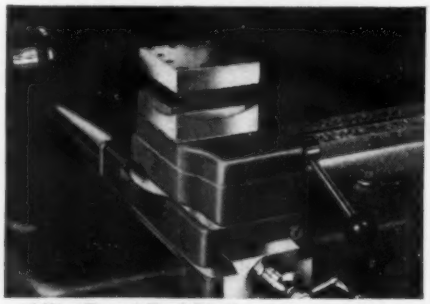
**Handwheel Draw-in Collet Attachment** is ideal for production and toolroom work that requires extremely close tolerances.



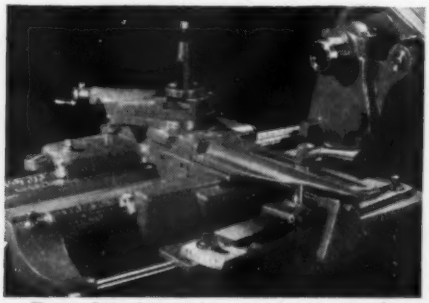
**Collets** from 1/16" to 1" in 1/64" steps. Complete sets of collets will save time.



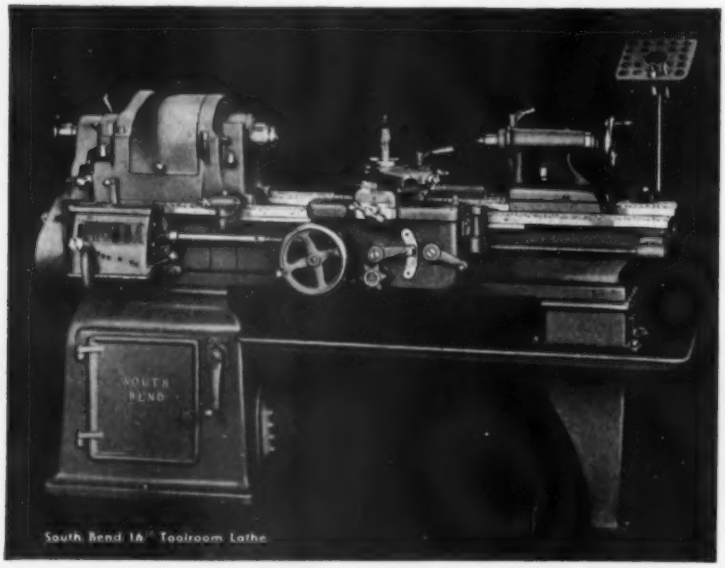

**Center Rest** and **Follower Rest** for supporting long bar work while turning, threading, drilling, boring, etc.



**4-Way Turret Tool Block** permits use of four cutting tools which simplifies tooling for repetitive operations.



**Taper Attachment** for accurate taper turning and boring. Quickly engaged. Graduated in both degrees and taper per foot.




South Bend 16" Toolroom Lathe

These and other practical attachments greatly increase the capacity of South Bend Lathes for handling a wide variety of operations. They simplify difficult set-ups, save time and effort, and often eliminate delay and expense of making special fixtures.

Write for Catalog 77R in which all South Bend Attachments are illustrated and described. Also, state size and type of lathe required. These attachments are only available for use on South Bend Lathes.

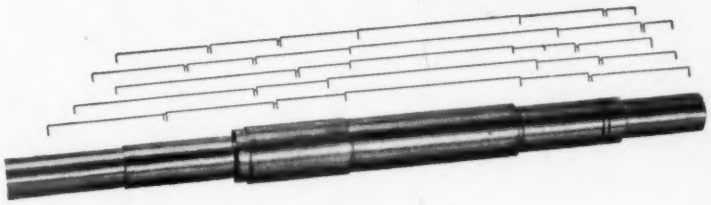
**SOUTH BEND LATHE WORKS**

*Lathe Builders Since 1906*

**419 E. MADISON STREET, SOUTH BEND 22, INDIANA**

# Compare the ACME-GRIDLEY AUTOMATIC

## with a Special Shaft Machine



The requirements of this motor shaft are high precision, a high degree of concentricity, smooth finish and low cost.

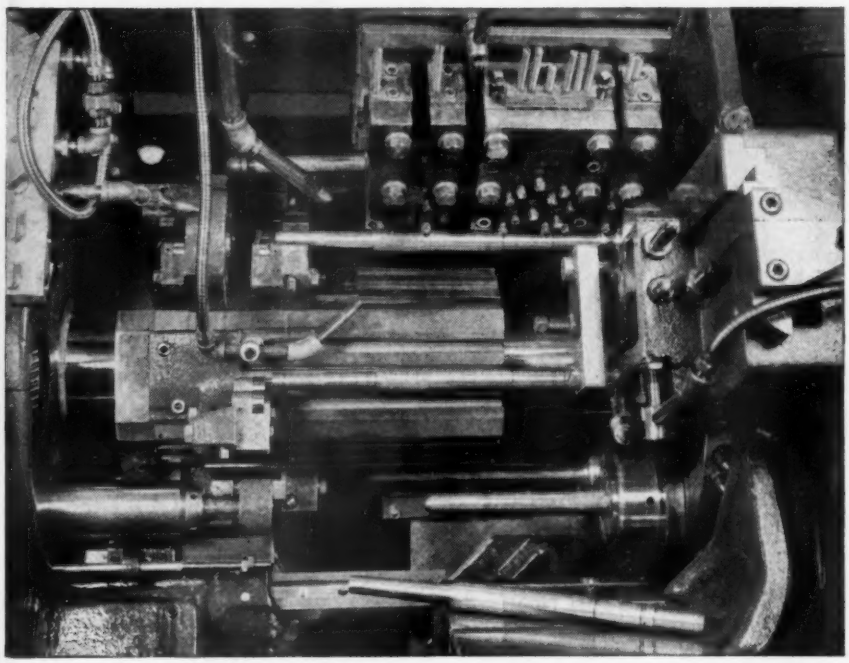
You can turn it on a one-purpose shaft machine—or on an Acme-Gridley Bar Automatic.

On either machine, you can produce a variety of shaft designs and dimensions, as the sketch indicates.

But when you consider machine tool investment, remember that the Acme-Gridley Automatic is a universal machine. It can turn out thousands of other parts, with equal precision, speed and low cost.

You can make big cost reductions through the broad adaptability of Acme-Gridley Automatics to jobs of almost infinite variety—through their flexibility of tooling for combination operations.

When you retool for new production, why not draw upon our broad experience with both Bar and Chucking Automatics? Write us—any time.

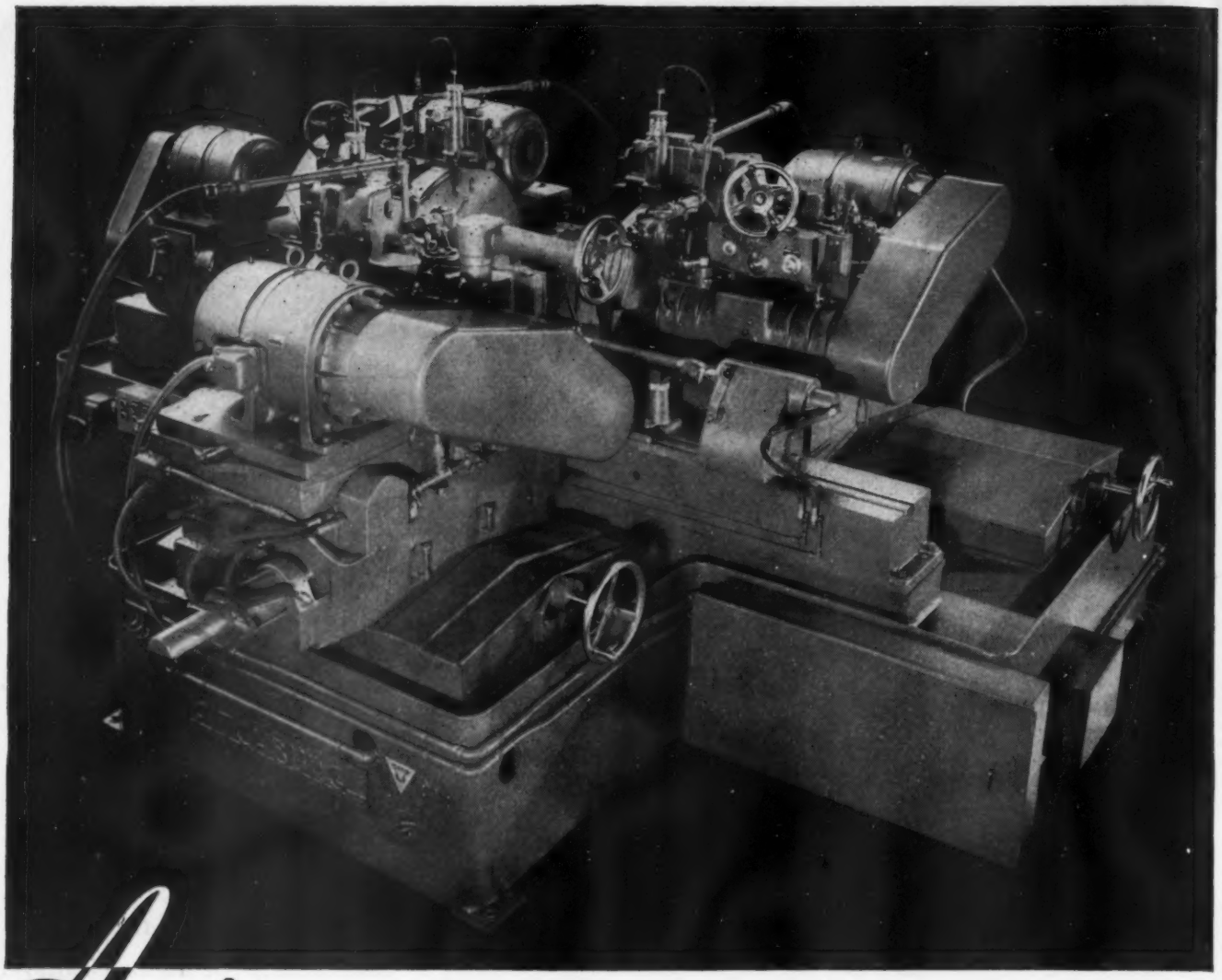


**A single set of tools on this Acme-Gridley Bar Automatic can be adjusted to produce an infinite variety of shaft work, as suggested by the sketch above.**

# The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

**COLLETS AND PUSHERS**
The design, materials and methods of processing GENUINE Acme-Gridley Collets and Pushers are vital to continuous low-cost performance on your Multiple Spindle Automatics.
*Bulletin CP-45*



# *Again* THREE HEADS ARE BETTER THAN ONE

. . . Because Fitchburg engineers have combined three standard Bowgage Grinding Heads on a special base to plunge-cut grind three spottings on a 96" torsion spring for tanks. All three dimensions are ground at the same time—and within the time of the longest single grinding operation — and in one handling, with the consequent saving in time and reduced danger of spoilage.

Get the complete facts. The open engineering mind instantly makes a favorable comparison between Fitchburg automatic precision grinding and any other equipment on the market! Install the Fitchburg method now and use your "Head" to cut costs and speed production.

Send your blueprints for our engineers' recommendations. There will be no obligation.

*A triple-head Fitchburg Grinder like this may be converted into one double-head grinder and one single-head grinder, or three single grinders. Heads are interchangeable — save your investment.*

FITCHBURG GRINDING MACHINE CORP.
FITCHBURG, MASSACHUSETTS, U. S. A.
Manufacturers of — Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Both Full Universal Grinders and Special Purpose Grinders.

# Reduce

## PRODUCTION COSTS with

# RED RING

# Naloy Broaches

The service requirements of a broach are unlike those of other metal cutting tools. The broach must withstand either tensile or bending stress in addition to shear and severe abrasion, often under critical dimensional restrictions. Consequently its design and the material from which it is made are both extremely important elements in its operation.

Broach engineering technique is not available from a hand book — it takes years of experience. Nor can the best results be obtained when broaches are manufactured by the methods used for other cutting tools.

After extensive research Red Ring engineers developed the Naloy treatment which has proved its marked superiority.

A Naloy treated broach is very hard without being brittle; is very tough and has exceptional resistance to abrasion. It has produced 50% and more parts per grind than its nearest competitor. The Naloy treatment is obtainable only in Red Ring Broaches. Red Ring engineers are specialists on involute form broaches.

## NATIONAL BROACH AND MACHINE CO.

*RED RING PRODUCTS*

**5600 ST. JEAN • DETROIT 13, MICH.**

*SPECIALISTS IN SPUR AND HELICAL INVOLUTE GEAR PRACTICE*

*ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORMS*

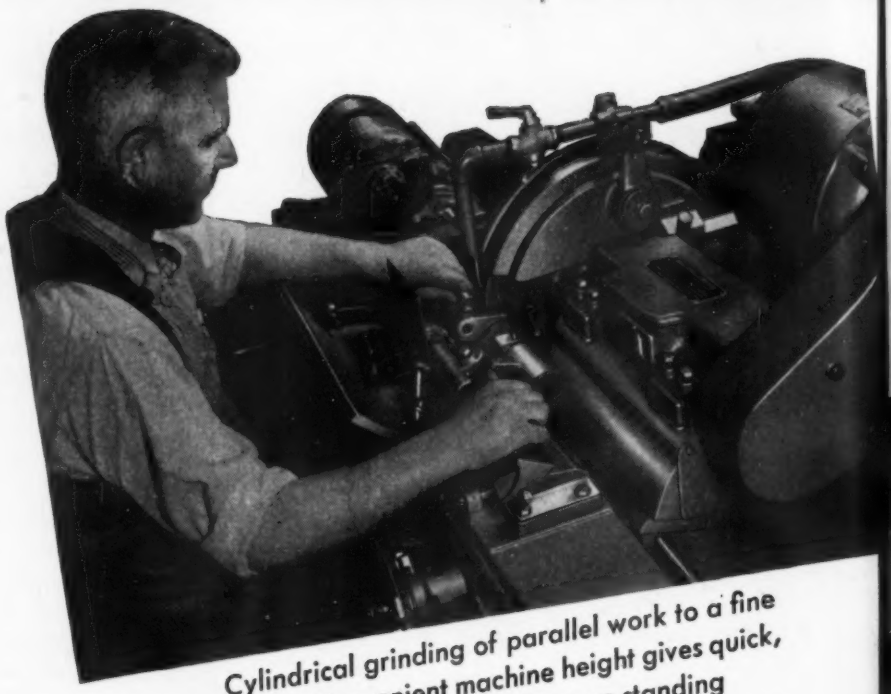
# HIGH PRODUCTION ON SMALL PARTS . . . Many jobs to .0001" limit and fine micro-inch readings

## OPERATING CONVENIENCE

— All controls within easy reach

— Recessed base

— Handy table tray



Cylindrical grinding of parallel work to a fine finish. Convenient machine height gives quick, easy operation either sitting or standing

Traverse grinding accurately to a shoulder — spindle end-play is automatically taken up

## UNUSUALLY CLOSE-FITTING SPINDLE — means fine finish with repeat accuracy

— Minimum spark-out time

— Correct adjustment quickly and positively obtained

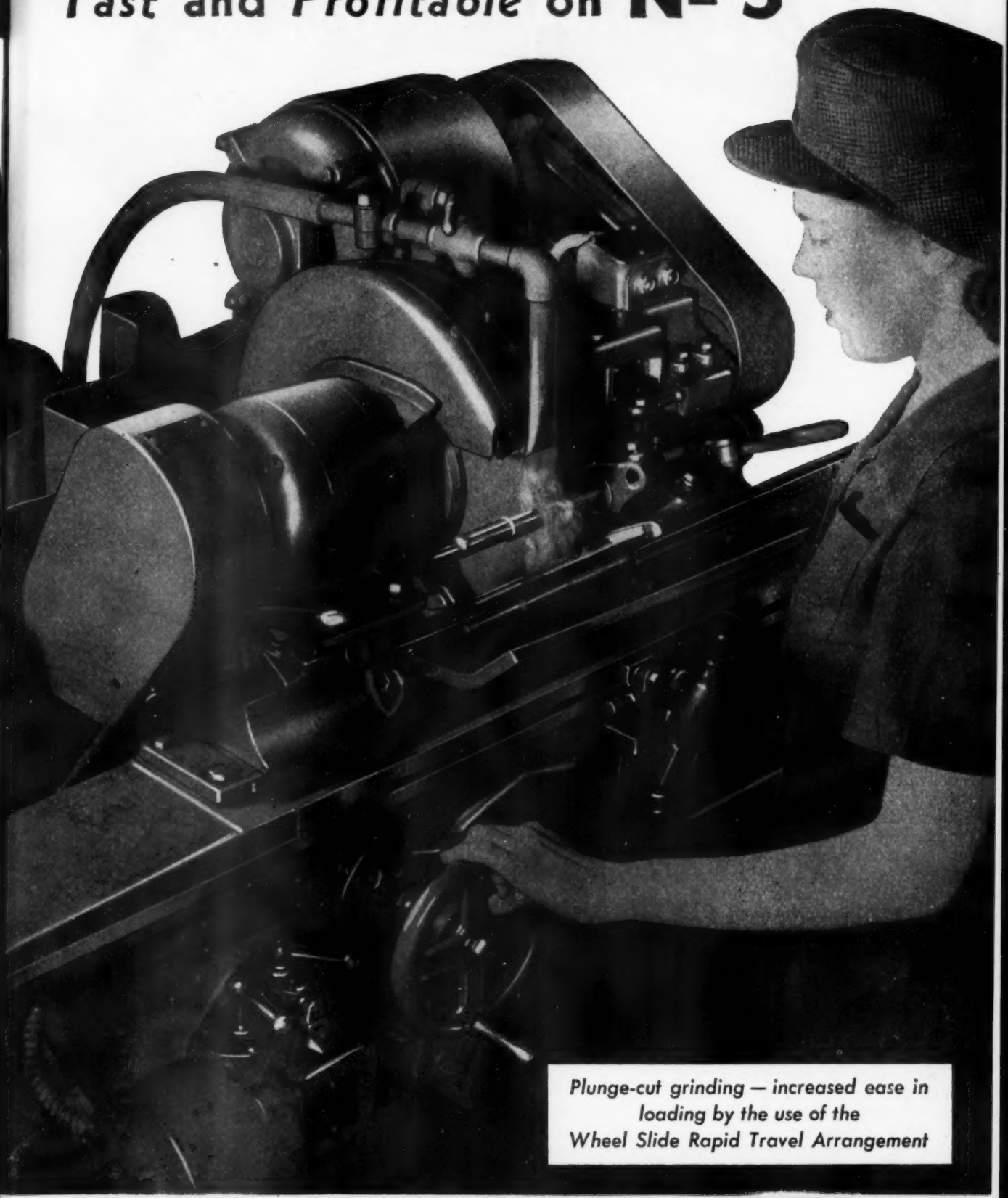
May we furnish details on the No. 5 Plain Grinding Machine?

B·S BROWN & SHARPE MFG. CO.
PROVIDENCE 1, R. I., U. S. A.

# BROWN &

# CLOSE-TOLERANCE GRINDING

## *Fast and Profitable on* No. 5



*Plunge-cut grinding — increased ease in loading by the use of the Wheel Slide Rapid Travel Arrangement*

# SHARPE

# New ELECTRONIC CONTROL FOR SMALL RESISTANCE-WELDING JOBS

*This new G-E electronic heat control used with a small bench welder is an important factor in the high production rate attained in the welding of electronic tube parts.*

## WHAT IT OFFERS YOU

1. **Synchronous Precision Timing**
   a. Easy, accurate adjustment
   b. Uniform results
2. **Electronic Heat Control**
   a. High production
   b. Little or no distortion of material
   c. Satisfactory welding of small difficult-to-weld parts

NOW you can be certain that your low-capacity spot welders will be precisely controlled, insuring better welding results. When connected to a suitable transformer, this control, used either on a bench welder or with welding tongs, makes an ideal combination for welding of all sorts of small parts. A good example of this is in the welding of tube parts where tungsten, fernico, copper, tantalum, magnesium, and molybdenum are constantly being welded with good results.

### Synchronous Precision Timing

You know that accurate control of weld time is essential to the consistent welding of small parts, because the optimum weld time for high production and little distortion is less than ten cycles. In fact, it is often only one or two cycles.

Synchronous precision timing enables you to adjust the weld time in one-cycle steps from one to ten cycles. Also, with this type of timing you are assured that the preset timing will be exact (no deviations from weld to weld).

### Electronic Heat Control

You also know that, in welding small parts, it is vital to have a means of adjusting the current to very close values, as relatively slight changes in welding current will result in either no welds, weak welds, or burned parts. Adjustable electronic heat control provides the necessary preciseness of current control for welding small parts—especially those metals and alloys which are difficult to weld consistently.

### Flexibility of Operation

This equipment is suitable for operation on either 230- or 460-volt, 60-cycle power supply. Because the tubes have the same current rating on either voltage, the transformer that is used on a 460-volt supply can be twice as large as that required on a 230-volt source—this will approximately double the secondary or welding current.

### How This Control Can Help You

If you're doing small welding jobs, this control can undoubtedly help you speed up production by providing precise welding control, and thereby reducing rejects. Our local office will be glad to send you further information on the CR7503-A140A2 timer, or talk over the possibility of installing these controls on your assembly line. However, if you prefer, write directly to General Electric Co., Schenectady 5, N. Y.

**GENERAL ELECTRIC**

**RESISTANCE-WELDING CONTROL**

*Buy all the BONDS you can—and keep all you buy*

# *Sitting pretty . . .*

## *and 7 pounds lighter*

Made of Mazlo Magnesium, this new lightweight seat, designed by Douglas Aircraft Company engineers, reduces the weight per 21-passenger plane by 147 pounds. Yet it costs but slightly more than half the price of the old type chairs. This savings in weight alone, can mean an added passenger, or the revenue on 147 pounds of cargo.

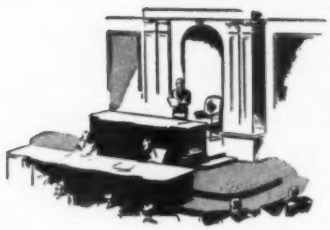
This example of what magnesium is doing for the aviation industry can apply to your products, too. Magnesium alloys give the required strength and dependability, along with maximum savings in weight. It's the perfect metal for things that move, must be carried, must endure.

American Magnesium engineers will gladly sit down with you and help you employ magnesium to best advantage. Write Aluminum Company of America, Sales Agent for American Magnesium Products, 1709 Gulf Building, Pittsburgh 19, Penna.

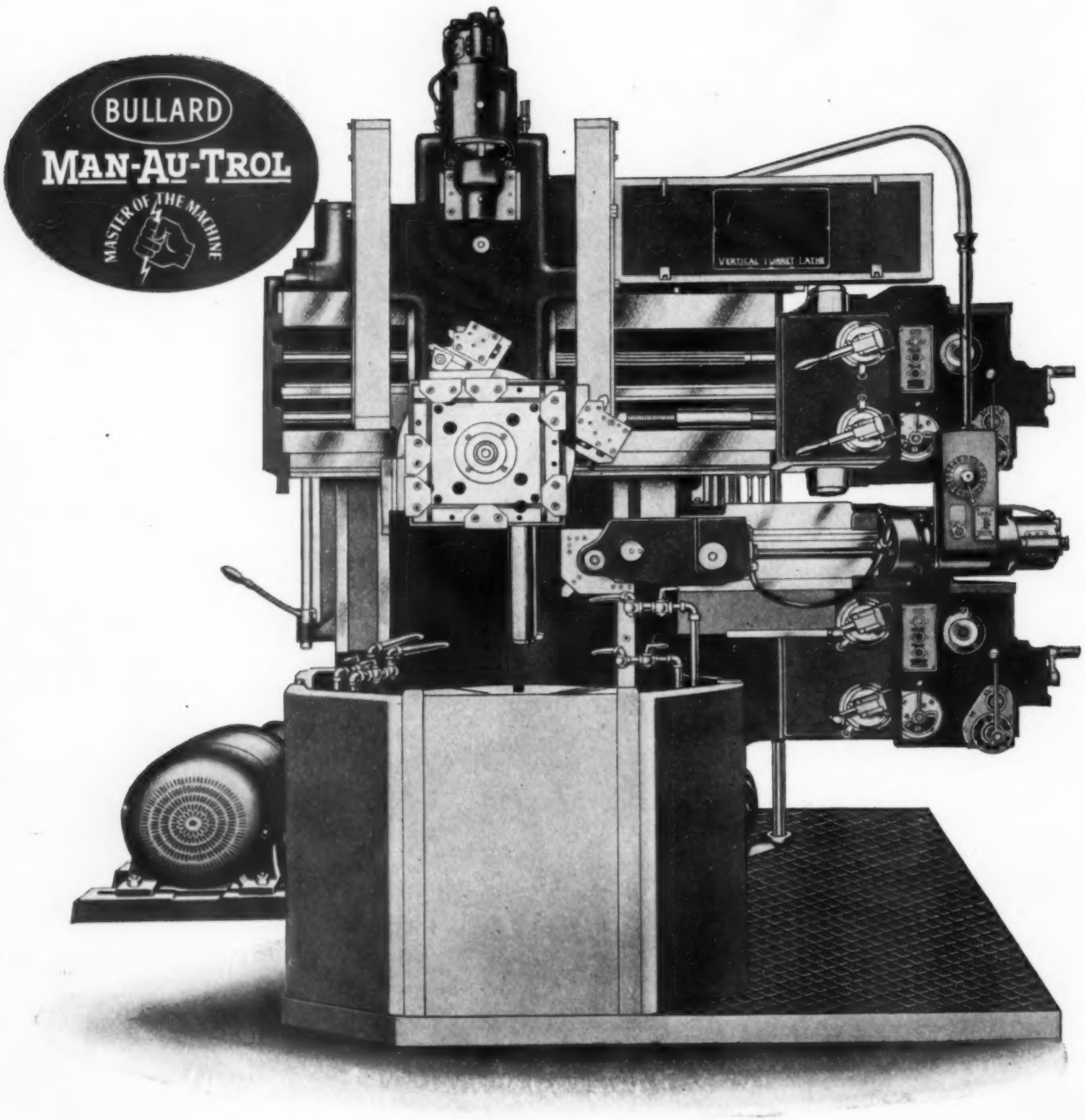
MAGNESIUM MAZLO PRODUCTS

**AMERICAN MAGNESIUM CORPORATION**

SUBSIDIARY OF ALUMINUM COMPANY OF AMERICA



# THE STATE OF THE NATION TOMORRO



# RO IS IN YOUR STATE OF MIND TODAY

Two choices . . . and only two . . . now face you and others who make Industry's decisions.

Either you can sit back and *wait* to see what happens . . .

Or you can look ahead and *make* things happen.

If you choose the former, you *cause* to happen what you *hope* will not . . . idle machines with consequent troubles . . . continued government controls.

If you choose the latter, you *show government* that you want to run your own business and can run it efficiently . . . you *show labor* that you have confidence in its willingness to work with you for the common good . . . you *show the people* that busy machines are the foundation of America's high standard of living.

When machines produce more, unit costs go down . . . while wages are maintained on a high level. More buying power generates the greater demand that increases production even more.

*What is your choice?* It *must* be to make your machines produce more . . . to lower unit production costs . . . to keep employment at high levels. And because that must be your choice, you will want to investigate the Bullard *Man-Au-Trol* principle of Automaticity . . . which, for the first time, makes an automatic machine even more versatile than a manually-operated machine.

## HOW THE BULLARD MAN-AU-TROL VERTICAL TURRET LATHE LOWERS UNIT PRODUCTION COSTS

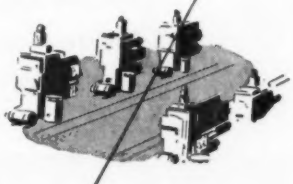
**1. LIGHTENS LABOR'S LOAD:** The operator goes once through the machining cycle manually, setting the best production method into an automatic cycle. Then he merely loads, supervises and unloads while the Man-Au-Trol does the work.

**2. MAKES AUTOMATICITY VERSATILE:** It automatically machines any and all work which the Vertical Turret Lathe can handle when operated manually. Is instantly convertible for manual operation on the same piece or an entirely different piece without affecting the automatic cycle for which it is set.

**3. SAVES SET-UP TIME:** Unlike most other automatic machines, its set-up time from one class of work to another is only slightly more than for a manually-operated machine.

**4. REDUCES SALVAGE COSTS:** It machines day after day with a degree of accuracy impossible under manual operation because it eliminates human and cumulative error.

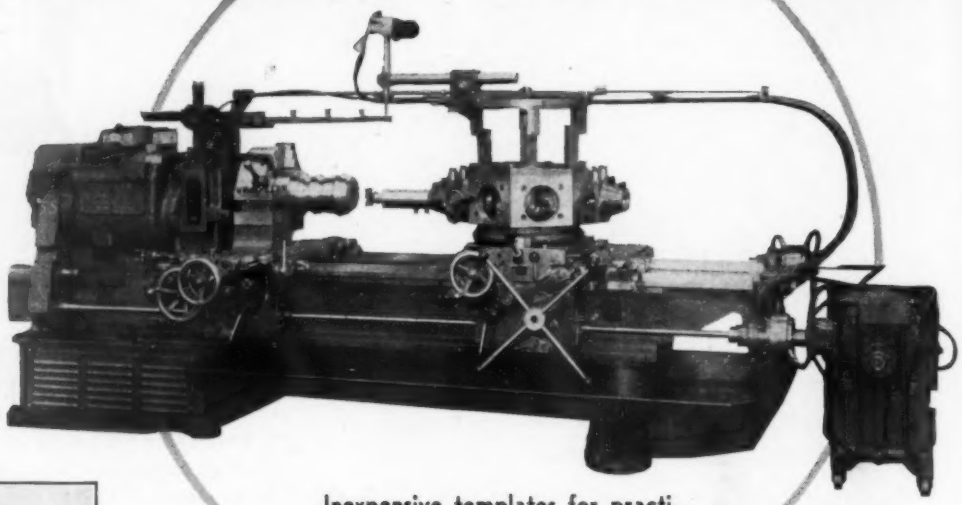
For additional facts about the way the new Bullard Man-Au-Trol Vertical Turret Lathes minimize tool investment, reduce machining time and other manufacturing costs, write for Bulletin MAV-G-1. The Bullard Company, Bridgeport 2, Conn.



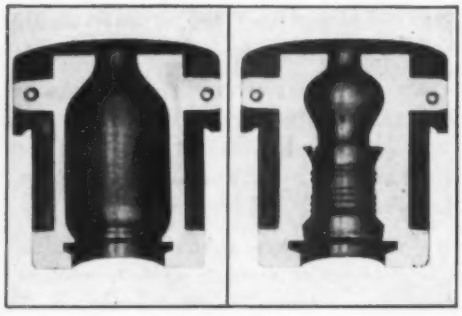
**BULLARD CREATES *NEW METHODS* TO MAKE MACHINES DO MORE**

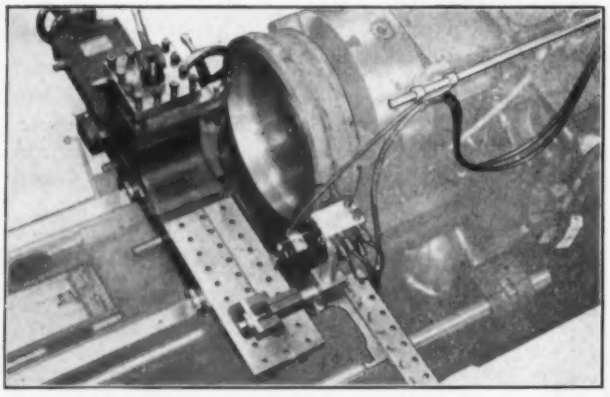
# *Something New!*

## LOW COST DUPLICATING WITH THE ACME-DUPLIMATIC



Inexpensive templates for practically any class of work is all that is required for the different jobs.





A new development in low cost contour turning and boring for Plastic, Glass and Rubber Molds; all types of Dies. No shapes too difficult.

Through the means of a push button station, the duplicating equipment can be disengaged, and the machine is then ready for standard turret lathe work.

If you are interested in lowering the cost on your present methods for this type production — we can help you. It's a subject for our engineers — so — send us your problems. No obligation — of course.

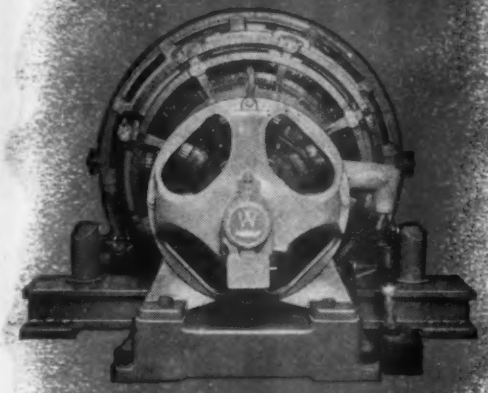
**The ACME MACHINE TOOL Co.**
CINCINNATI 32, OHIO

THE WESTINGHOUSE

# Photo-Troller

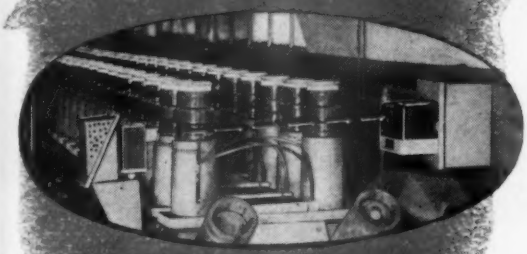
The operator of this press is protected by the Photo-Troller. If the operator's hand enters the danger zone, the beam of light is broken and the machine is locked against operation.

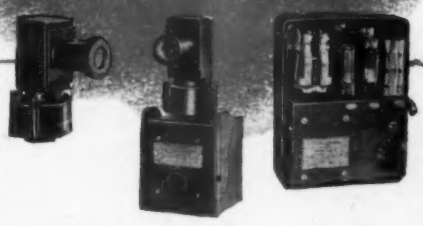
## SEES ALL... AND TELLS!



Overloads and improper operating conditions resulting in commutator sparking are detected by the Photo-Troller on this large direct-current motor.

Control of fountains and inspection on conveyor lines are other Photo-Troller applications.





The Photo-Troller consists of a light source and a phototube. Phototube may be mounted in the control cabinet or in extended housing.

In the "wink of an eye" . . . an all-seeing electronic "eye" . . . the Photo-Troller can guard workers' safety . . . count products or patrons . . . control production . . . and inspect products for weight and size. These are only a few of the hundreds of industrial and commercial jobs that are being done with speed and accuracy by the Westinghouse Photo-Troller.

A phototube in the Photo-Troller responds to the increase or decrease of light falling on it. This initiates an electrical response which will start a motor, operate a counter, give a signal, or otherwise control a desired action for a variety of flexible applications. Photo-Trollers are easily installed, easily adjusted, and directly operate heavy-duty contactors with no delicate, low-current relays. Both first costs and maintenance costs are low.

For complete information about the Photo-Troller and its application to your business, write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. J-60570

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

*Electronics at Work*

# An Important

For years, Warner & Swasey has taken the position that its responsibility does not end with the delivery of a Warner & Swasey machine. We will continue this policy throughout this period when many government-owned surplus Warner & Swasey Turret Lathes are passing through many hands.

Besides the obligation we owe a Warner & Swasey owner, wherever he may be, we also have a deep interest in a sound, efficient, postwar national economy. It is our belief that low-cost high-production is vital to such an economy—and that means using the most efficient methods and tools available.

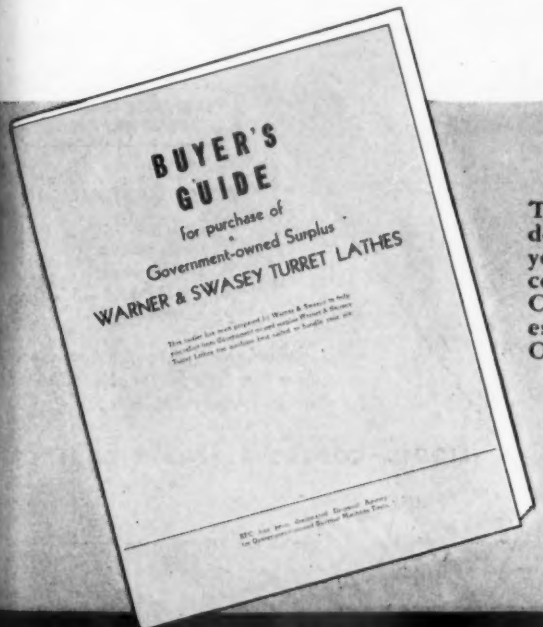
*Even though these machines have undergone seven-day, three-shift operation, in the aggregate, they still retain sound economic value. Industry may well use them to advantage if properly selected. The turret lathes, ten years of age or over at the start of the war, represent the real surplus problem . . . not the war-built surplus.*

# Statement of Policy

## Warner & Swasey Maintains Records of Every Warner & Swasey Machine in Service

Given model and serial number, your nearest Warner & Swasey Branch Office can tell you *when* the machine went into service, *what special specifications* were involved—*what original equipment*, accessories and tools were included.

They can aid you further by giving you a report. Knowing the jobs you expect to use these turret lathes on will enable them to advise you whether the machine will serve you capably, or whether it would handicap your future production when compared to other possibilities for doing your job better.




**SEND FOR FREE COPY**

The "Buyers Guide" will prove a valuable aid in helping you determine the proper Warner & Swasey Turret Lathe to suit your needs in the purchase of surplus turret lathes. To get a copy, just write to us here in Cleveland or contact your nearest Warner & Swasey Branch Office.

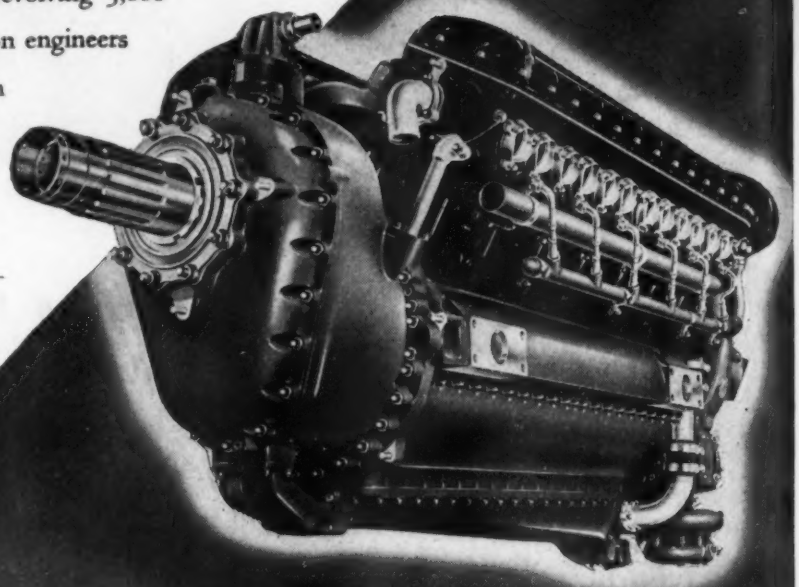
*You can Machine it Better, Faster, for Less... with a Warner & Swasey*

WARNER & SWASEY
Machine Tools
*Cleveland*

TURRET LATHES, SADDLE AND RAM TYPES — CHUCKING AND BAR TOOLS — PRECISION TAPPING AND THREADING MACHINES

# 21 JEWEL ENGINE

Like a fine watch, the Allison engine has a "21-jewel movement"—assuring dependability and long life. The jewels are the major silver-plated and copper-lead cast sleeve-type bearings, which absorb terrific loads and high temperatures from shafts revolving 3,000 times a minute. ★ Twenty years ago, Allison engineers pioneered the development of higher-precision sleeve-type bearings to enable engines to develop higher horsepower. Today, installed in virtually every aircraft engine made in this country—as well as Allison—these bearings have made good—at horsepowers far beyond the dreams of the Allison pioneers. ★ Now Allison bearings are available for other fine engines and machines to serve a world at peace.



KEEP AMERICA STRONG
BUY VICTORY BONDS

**POWERED BY ALLISON**

*P-38—Lightning*
*P-39—Airacobra*
*P-40—Warhawk*
*A-36 and P-51A—Mustang*
*P-63—Kingcobra*

*Approximately 70,000 Allison engines have been built for the above planes of the U. S. Army Air Forces.*

**LIQUID-COOLED AIRCRAFT ENGINES**

Allison

DIVISION OF GM GENERAL MOTORS

Indianapolis, Indiana

*Every Sunday Afternoon*—GENERAL MOTORS SYMPHONY OF THE AIR — *NBC Network*

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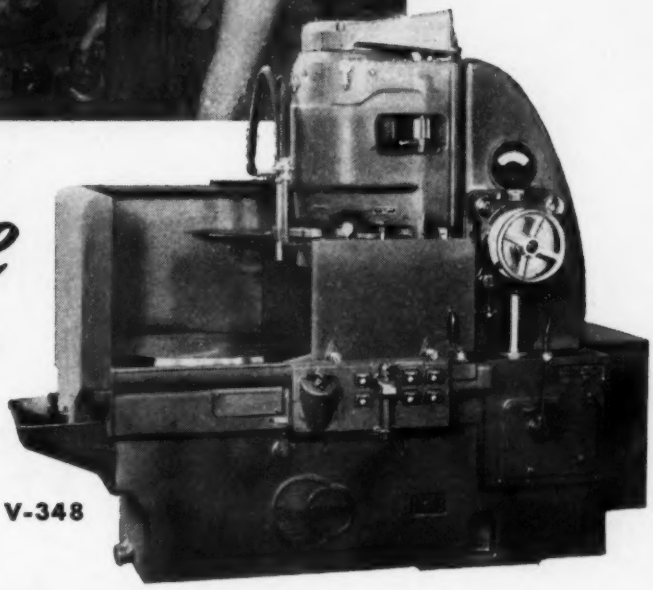

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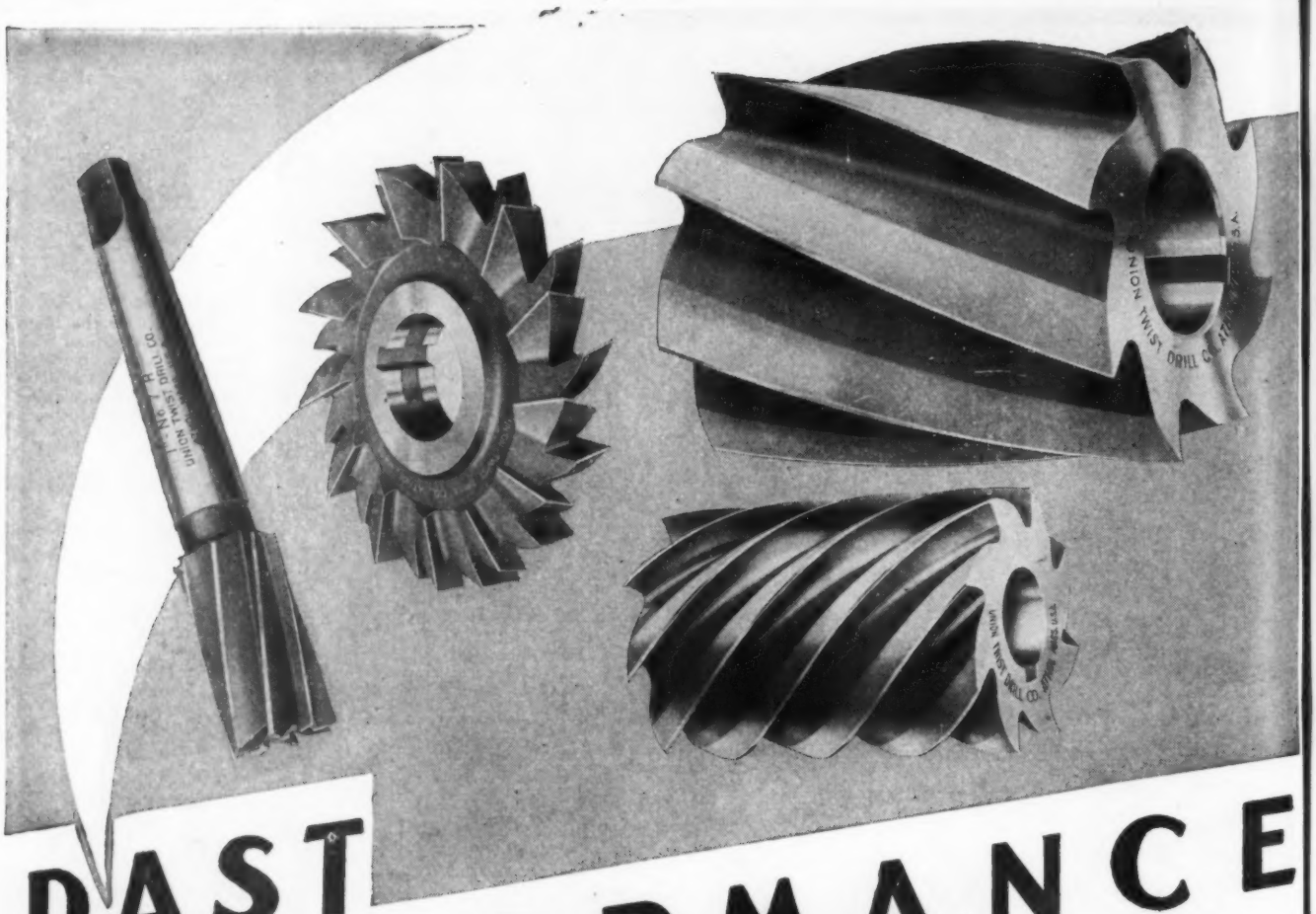

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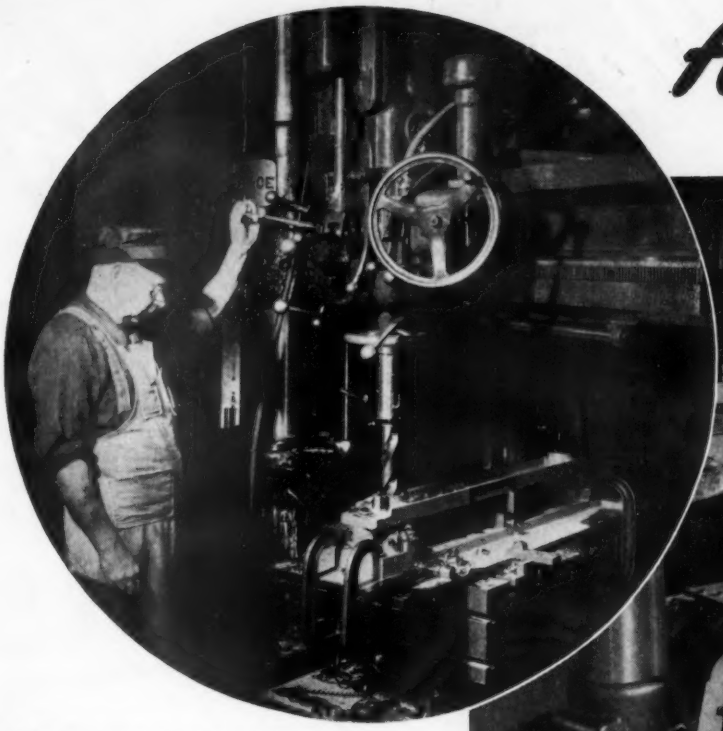
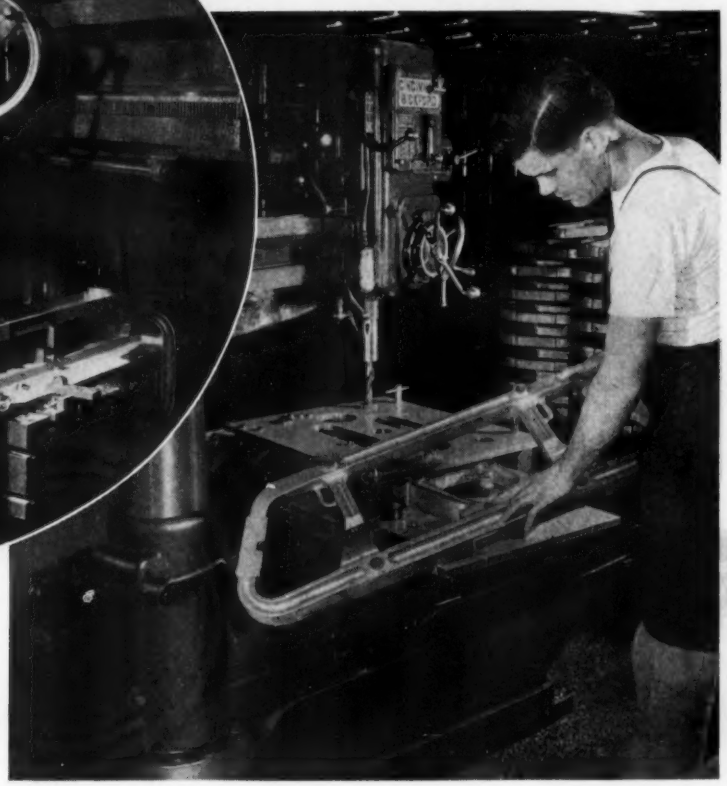


A large hole-drilling operation at Douglas Aircraft Company, Santa Monica, Calif.



A drilling operation at Lockheed Aircraft, Burbank, Calif.

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# Labor: An Explosive Issue

LABOR RELATIONS is the most explosive issue before the country.

Some labor leaders are taking pride in flexing their muscles publicly, saying in effect, "See how strong we are. We intend to get what we want, or else."

The United Automobile Workers have asked for a strike vote at General Motors plants. They are starting out to make good on their threat that their demands must be granted in full or they will pick off the companies one at a time, using Hitler's technique of "divide and conquer."

Management, on the whole, has maintained an attitude of watchful waiting. Some manufacturers are reported to feel that if there must be a showdown, the best time for it is now rather than later.

From any angle, the labor situation is highly charged. There are numerous strikes today and more serious ones in the offing. It is time to see that things do not get out of hand.

The three parties involved—labor, management and government—bear the responsibility for preventing what could easily develop into a national catastrophe.

The obligations of labor officers extend far beyond their personal fortunes and the fortunes of their own unions—they extend to the welfare of the communities and of the nation. For the public good, which is paramount, their demands must be kept within reasonable bounds, and their bargaining should be done with a sincere effort to find a solution. The strike weapon should not be brandished except as a last resort. Threats serve to incite the other party.

Management in turn has a grave responsibility to accept collective bargaining without cavil and not give it merely lip service. It must be careful not to assume an intransigent policy that in itself would be an invitation to labor trouble. It must carry out the spirit as well as the letter of its agreements with its employees.

A multitude of small, local labor incidents can and should be settled on the local level and not carried to regional jurisdictions and eventually to Washington. There they immediately assume a significance that they did not have in the beginning.

The greatest good that the government can do is to remove the impression built up in recent years that it is a partisan of one side rather than an impartial third party ready and eager to aid the two parties involved to reach an amicable agreement.

The impending Labor-Management Conference sponsored jointly by the Department of Labor and the Department of Commerce gives hope that the government is moving in the direction of remaining aloof from both sides and acting as a mediator to bring labor and management onto a common ground.

The transition from war to a civilian economy can be made a smoother and quicker process if labor, management and government exercise statesmanship in maintaining labor peace. If statesmanship is lacking, reconversion will be seriously retarded. Bitterness and strife between economic groups will harm and disrupt the nation's life.

It would be tragic and dangerous in the months ahead to have the country torn asunder by a battle royal on the economic front, immediately after achieving a glorious victory on the military front. It must not be allowed to happen!

Burnham Finney

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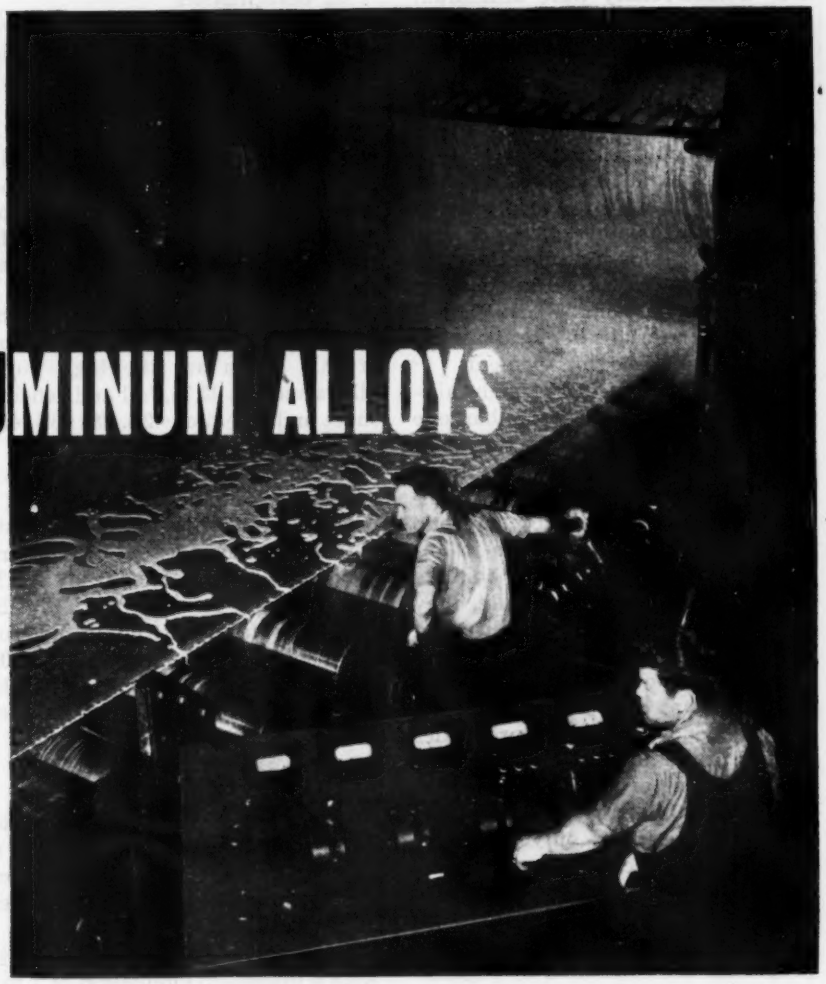
# Characteristics of WROUGHT ALUMINUM ALLOYS

BY OWEN LEE MITCHELL
METALLURGIST
REYNOLDS METALS COMPANY



Heavy rolls of a hot-rolling mill are used for wrought working the aluminum slab by physical reduction of the material to sheet stock

**TO THOSE** not thoroughly familiar with aluminum, the vast number of wrought alloys available is confusing and complex. Too often, an attempt is made to employ an alloy without first determining whether that particular alloy will be suitable for the application. In addition, even if a certain alloy proves satisfactory, there may be another which will be more advantageous from an economic standpoint.

Commercially pure aluminum in the annealed state (2S-O) has a tensile strength of 12,000 to 15,000 lb. per sq. in. R303-T275, in certain commodities, has a tensile strength in excess of 80,000 lb. per sq. in. Between these limits lie more than a hundred alloys with varying degrees of mechanical, chemical, physical and electrical properties.

To understand this numerous array of wrought aluminum alloys one must know the nomenclature used.

The suffix S following the alloy number, on any aluminum base alloy, indicates that it is a wrought alloy. In addition, there are several wrought alloys, developed by the Reynolds Metals Company in the R300 series, which do not carry the suffix S.

The X group of alloys contains those alloys that are restricted. The use of these alloys must, of necessity, be restricted until enough information can be obtained to justify their existence.

Several alloys have retained their X status for a period of years. Generally these alloys were developed specifically for one customer or are still under patent restrictions. The X status alleviates the possibility of these alloys being improperly distributed. The prefix X for wrought alloys should not be confused with the X casting alloy.

A prefix other than X or M on wrought alloys indicates a modification of the original chemical composition. The prefix A indicates the first modification, the prefix B the second modification and so on. An example of this is the alloy 51S. The composition of this alloy was changed by the addition of chromium and is known as A51S. Alloys

**Factors involved in selection of wrought aluminum alloys for a specific product vary widely with deviations in the end use and the manufacturing steps in its fabrication**

with the X classification follow the same rules, but if an alloy is changed from the X status all prefixes then in effect are dropped.

Pure aluminum is extremely soft and ductile and finds only limited use. Commercially pure aluminum contains small percentages of impurities which increase the tensile strength approximately 50 percent. Further to increase the mechanical properties, substantial amounts of alloying elements are added.

The principal alloying element contained by an alloy is incorporated into the nomenclature. The numeral of a wrought alloy indicates the chief alloying element, providing the alloy contains the suffix S. In Table I are given the alloy numeral ranges with the chief alloying element.

Practically all of the wrought aluminum alloys contain more than one intentionally added alloying element as well as the normally present impurities. An element may be intentionally added to one alloy or group of alloys and be undesirable in another alloy. The reasons for this are varied, but, as a general rule, they are tied in with solid solubility and the affinity the various elements have for each other.

The amount of each element in an alloy depends upon the properties desired in the finished product, since the addition of each element or combination of elements exerts characteristics possessed only by themselves. The mechanical properties, the ratio of tensile to yield strength, the resistance to corrosion, the surface appearance and many other properties are controlled by regulating the addition of the various elements.

The addition of alloying elements alone increases the strength of the alloys far in excess of that possessed by pure aluminum. To obtain additional strength, many metallurgical processes are employed.

There are eleven principal methods commercially employed to increase the strength of aluminum;

1. Addition of alloying elements.
2. Plastic deformation by cold reduction in cross-sectional area.
3. Precipitation thermal treatment only.
4. Solution heat-treatment only.
5. Solution heat-treatment, followed by natural precipitation.
6. Solution heat-treatment, followed by artificial precipitation.
7. Solution heat-treatment, followed by plastic deformation.
8. Solution heat-treatment, followed by precipitation, followed by plastic deformation.
9. Solution heat-treatment, followed by plastic deformation, followed by precipitation.
10. Solution heat-treatment, followed by plastic deformation, followed by precipitation, followed by plastic deformation.
11. Solution heat-treatment, followed by precipitation, followed by plastic deformation, followed by precipitation.

The elements or combination of elements used to strengthen aluminum can be divided into two broad groups. One group contains those elements which remain in solid solution or form constituents which are insoluble. This group is known as the common or non-heat-treatable alloys. The major commercial alloys of this group are the high purity alloys such as 99.75, foil and reflector sheet and the alloys 2S, 3S, 43S, 45S, 52S and 56S.

An increase in the mechanical properties of the common alloys is usually attainable only by plastic deformation, generally by cold reduction of cross-sectional area. The commercially feasible maximum increase in tensile strength by cold work is seldom more than 14,000 lb. per sq. in., and this is obtainable only by great sacrifice of the percentage elongation.

### Drawing Qualities

Care should be exercised when judging a common alloy solely on the percentage elongation as there are many drawing operations where an increase in tensile strength is more important. For example, 2S½H with a minimum elongation of 7 percent in 2 in. will often take a deeper draw than 2S¼H with a minimum elongation of 10 percent in 2 in., simply because it possesses a higher tensile strength.

The main advantages of the common alloys are their ease of fabrication, low cost, and resistance to corrosion. Their chief disadvantages are their relatively low strengths and softness. To counteract these detrimental features the alloys can be further strengthened by plastic deformation. They are then referred to as strain-hardened alloys.

**TABLE I**

**PRINCIPAL ALLOYING ELEMENTS PRESENT IN RELATED ALLOYS**

| Alloy Numeral Range | Chief Alloying Element |
|---|---|
| 99.5 | 99.5 percent minimum aluminum commercially pure aluminum |
| 2S | manganese |
| 3S-9S | copper |
| 10S-29S | silicon |
| 30S-49S | magnesium |
| 50S-69S | zinc |
| 70S-79S | copper |
| R301 R317 | zinc |
| R303 | |

### Heat-Treatable Alloys

The second group of alloys consist of those which contain elements, groups of elements, or constituents that have considerable solid solubility at elevated temperatures and limited solid solubility at lower temperatures. The majority of the high-strength alloys of major importance fall into this group, which is commonly referred to as the "strong" or "heat-treatable" alloys. The more important alloys of this group are the copper-bearing alloys R301, 14S, 18S, 24S, 25S and 27S; the magnesium silicide alloys A51S, 53S and 61S; and the zinc bearing alloys R303, 75S and 76S.

The strength of the wrought alloys can be increased by plastic deformation, which is generally obtained by cold reduction in cross-section area. This method of obtaining additional strength is almost entirely limited to the common alloys, since the effect of such deformation is removed by any subsequent solution heat-treatment. The alloy 53S is sometimes used in the cold worked tempers, but there is seldom more than a 2,000 lb. per sq. in. difference between the tensile and yield strengths. Nevertheless, there are occasional applications where its use may be beneficial.

Aluminum alloys that are in the fully annealed condition are referred to as being in the O temper. When sufficient cold work has been performed to increase the tensile strength of a common alloy to the maximum commercially feasible by plastic deformation, the alloy is referred to as being in the H or fully hardened temper. The intermediate tempers ¼H, ½H and ¾H are produced by subjecting the common alloy to plastic deformation to such an extent that the tensile strength is increased, above the O properties, by the appropriate fraction of the over-all increase in strength feasible by such methods.

When producing sheet or plate, definite amounts of cold work are performed between each intermediate anneal. With strong alloys, metal

in this condition is known as "as-rolled" material and is designated by the suffix AR.

The advantage of this class of material is, of course, the price, since less expense is involved in its production. It is cheaper to produce the as-rolled temper than the O or annealed temper since as-rolled material is used in the production of annealed material.

Alloys which contain elements, groups of elements or constituents would, if they did not possess decreasing solid solubility, be classified as common or nonheat-treatable alloys.

After the heat-treatable alloys are fabricated to the desired thickness they are subjected to a solution heat-treatment. This treatment consists of bringing the alloy quickly up to a predetermined temperature, holding at this temperature a sufficient length of time to allow all or practically all of the soluble elements or constitutents to go into solid solution, and then rapidly quenching to prevent or to retard the precipitation of the supersaturated solid solution.

### *Precipitation Thermal Treatment*

Material that is subjected to the solution heat-treatment only, is referred to as being in the W temper. Many of the heat-treatable alloys, commercially used today, are fabricated in this temper as the maximum strengths of the alloys are realized by merely subjecting them to a precipitation or aging thermal treatment.

It is advantageous to use the W temper whenever possible, if a forming operation is performed, as this prevents warpage. There is always some warping when aluminum alloys are heat-treated which may have to be removed by subsequent operations. The use of the heat-treated material (W) is restricted by its low formability but it can be successfully used for many applications.

Alloys such as 14S, 18S, R301, A51S, 53S and 61S are often used in the W temper. Alloys such as 17S, 24S, R303 and 75S either fully or partially age at room temperature, and are therefore seldom used in this temper unless the forming operation is performed within one hour after solution heat-treatment.

In many applications the use of aluminum alloys in the W temper is feasible. For example, R301-W is finding many industrial uses where existing regulations demand that the maximum yield strength be not in excess of 80 percent of the tensile strength. A special precipitation thermal treatment also permits the use of 61S-T for such applications. This condition is often encountered when an aluminum alloy displaces a ferrous product.

It is often possible to use the W temper in applications that require definite minimum mechanical properties without drastic formability. In such cases the substitution of a stronger alloy in the W temper for a weaker alloy in the T temper may prove to be economically advantageous.

Many fabricating procedures used in the production of heat-treatable alloys are such that large amounts of soluble constitutents remain in solid solution. Under such conditions it is often possible to omit the solution heat-treatment and subject the alloy to a precipitation thermal treatment. Wrought alloys, that have been subjected to this treatment only, are identified by the suffix T5 following the alloy designation. An example of this is 53S-T5 extruded shapes, where the air cooling of the extrusions causes a partial solution heat-treatment.

The reason for using the T5 temper is the lower initial cost, since an expensive solution heat-treating operation is eliminated. Applications that call for optimum strength must resort to the more expensive solution heat-treated and aged material.

### *Natural Precipitation*

The heat-treatable wrought aluminum alloys are subdivided into two broad groups. One group contains such alloys as 17S and 24S which quickly age at room temperature. The other group requires a thermal treatment at slightly or moderately

**TABLE II**

**COMPARISON OF MECHANICAL PROPERTIES OF HIGH-STRENGTH ALUMINUM ALLOYS IN SHEET FORM**

| Alloy and Temper | Thickness In. | Tensile* Strength Lb./Sq. In. | Yield* Strength Lb./Sq. In. | Elongation* in 2 In. Percent |
|---|---|---|---|---|
| Pureclad 24S-T | Up to 0.063 in. | 59,000 | 39,000 | 10 to 13 |
| | 0.064 in. and Up | 62,000 | 40,000 | 11 to 13 |
| Pureclad 24S-RT | Up to 0.063 in. | 62,000 | 48,000 | 8 to 10 |
| | 0.064 in. and Up | 66,000 | 50,000 | 9 to 10 |
| 24S-T | Up to 0.249 in. | 64,000 | 42,000 | 10 to 15 |
| 24S-RT | Up to 0.249 in. | 69,000 | 52,000 | 10 to 12 |
| Pureclad 24S-T80 | Up to 0.063 in. | 60,000 | 47,000 | 8 |
| | 0.064 in. and Up | 62,000 | 49,000 | 8 |
| Pureclad 24S-T81 | Up to 0.063 in. | 62,000 | 54,000 | 5 |
| | 0.064 in. and Up | 65,000 | 56,000 | 5 |
| Pureclad 24S-T86 | Up to 0.063 in. | 66,000 | 62,000 | 3 |
| | 0.064 in. and Up | 69,000 | 65,000 | 3 |
| R301-W | Up to 0.039 in. | 56,000 | 37,000 | 14 |
| | 0.040 in. and Up | 57,000 | 37,000 | 15 |
| R301-T | Up to 0.039 in. | 63,000 | 56,000 | 7 |
| | 0.040 in. and Up | 64,000 | 57,000 | 8 |
| Clad 75S-T | Up to 0.039 in. | 70,000 | 60,000 | 7 |
| | 0.040 to 0.249 in. | 72,000 | 62,000 | 8 |
| R303-T275 | All | 74,000 | 69,000 | 7 |
| Clad R303-T275 | All | 70,000 | 64,000 | 7 |

**cross-grain properties*

elevated temperature to cause precipitation or aging to occur.

After aging, both groups are referred to as being in the T temper.

The alloys 17S and 24S are the two most important natural aging alloys, the precipitation process generally starting immediately after solution heat-treatment and being virtually complete after 48 hours. For this reason these alloys are seldom used in the W temper unless solution heat-treating equipment is available.

If the quench from the solution temperature is slow, or if improper cooling is obtained, preferential precipitation of the soluble constituents from the supersaturated solid solution occurs along the grain boundaries and certain crystallographic planes. When this happens, the alloy may be susceptible to intergranular corrosion. These alloys are, by nature, susceptible to this type of corrosion unless rigid controls are employed.

In addition to the probable impairment of the resistance to corrosion, the final strength obtainable is decreased if improper quenching is employed. This is due to the lack of effective solid solution, as the constituents that precipitate before the quench are of such size and distribution that they add nothing to the final obtainable strength.

A third detrimental feature of an improper quench is that the formability of the natural aging alloy is greatly decreased even though the mechanical properties may not be seriously impaired.

### *Duralumin Alloys*

Alloys such as 17S and 24S belong to the duralumin type of alloys which age at room temperature. The alloy 24S contains copper and magnesium in such proportions that the major portion of the hardening is obtained by the room temperature precipitation of the Al-Cu-Mg constituent.

With these alloys, the rapid quench from the solution heat-treating temperature merely delays the decomposition of the supersaturated solid solution; precipitation or aging occurs almost immediately after quenching and is virtually complete after 48 hours of room temperature aging. This natural precipitation can be retarded for several hours by controlling the temperature at 32 F., or, for several days, by holding at zero. Some products, such as 24S-T sheet, may have an insufficient resistance to intergranular corrosion under adverse corrosive conditions. To prevent this type of corrosion occurring, a surface layer of high purity aluminum is bonded to the strong alloy core material. This cladding of high purity aluminum gives anodic protection to the core metal, thereby preventing the corrosion of the strong alloy. These high purity cladded alloys are referred to as Pureclad or Alclad alloys and generally contain a layer on each side, the thickness varying from 2.5 to 5 percent, depending upon the gage of the sheet. The thickness of the cladding is chosen to offer adequate anodic protection and still retain maximum physical properties.

Alloys such as R301, R303 and 75S are available with alloy claddings which give additional strength to the core material as well as anodic protection. Such alloys are referred to as Clad alloys instead of Pureclad to indicate that the cladding is not high-purity aluminum.

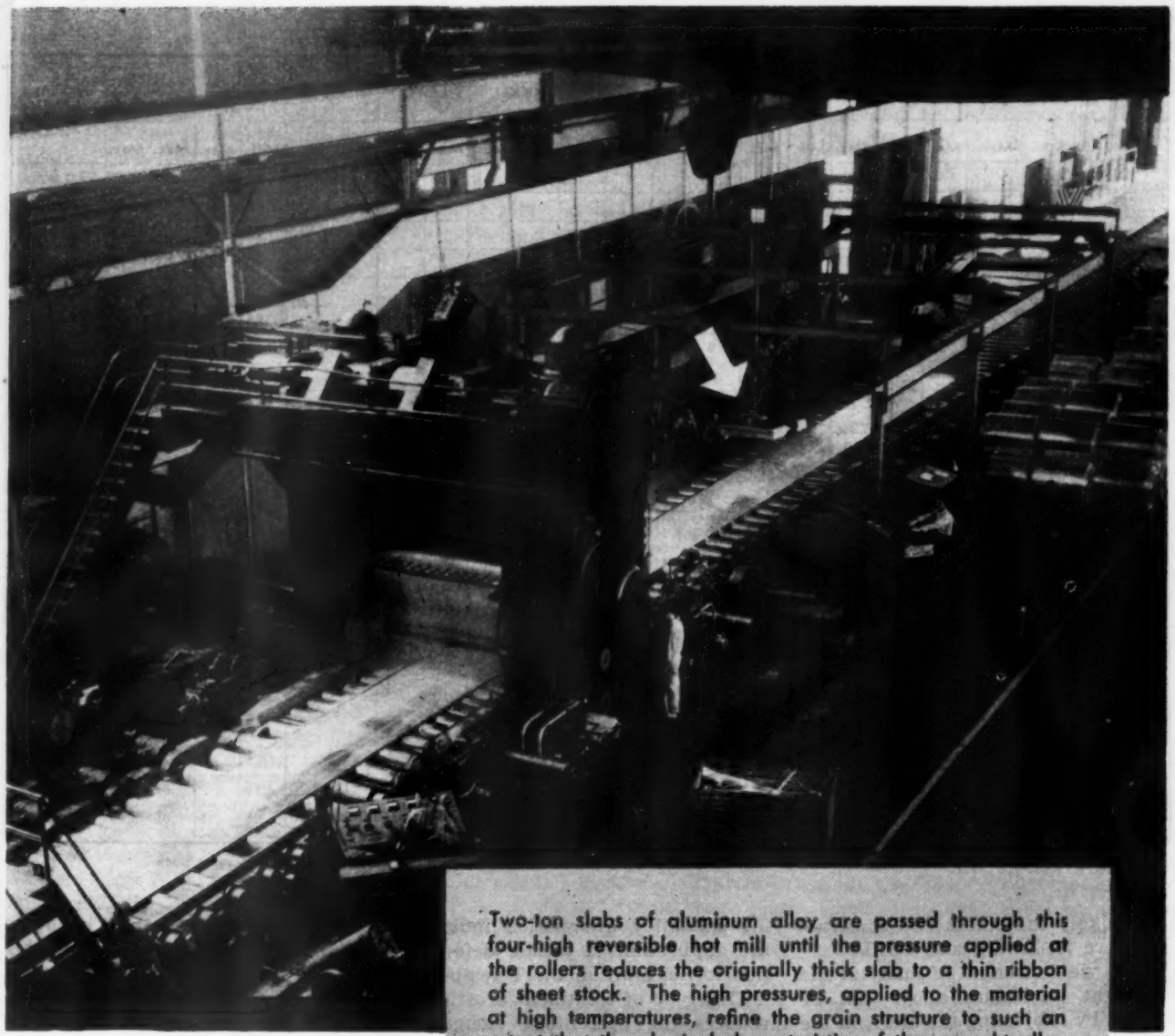
With the high-purity Clad alloys, the solution heat-treatment is critical. If insufficient solution of the soluble constituents occurs, the alloys will not yield their maximum physical properties. If the alloys are held at solution temperature an ex-

**TABLE III—CHARACTERISTICS OF WROUGHT ALLOYS PRODUCED IN SHEET FORM**

| ALLOY | |
|---|---|
| 2S | Low mechanical properties. Excellent drawing and forming properties. Excellent resistance to corrosion. |
| 3S | Slightly stronger than 2S. Very good drawing and forming properties. Excellent resistance to corrosion. |
| 52S | Medium mechanical properties. Good forming and drawing properties. Excellent resistance to corrosion in sea water. |
| 17S | Ages at room temperature. Good formability. A high-strength alloy. Good resistance to most types of corrosion. |
| 24S | Ages at room temperature. Has higher strengths than 17S with comparable workability and resistance to corrosion. |
| 53S | Medium mechanical properties. Very good forming characteristics. Excellent resistance to all types of corrosion. |
| 61S | Medium physical properties. Forming characteristics slightly superior to 53S. Excellent resistance to corrosion. |
| R301 | Clad material. Mechanical properties comparable to 14S. Corrosion resistance comparable to 61S. Good forming characteristics. |
| R303 | Excellent mechanical properties. Formability inferior to 24S. Excellent resistance to all types of corrosion. |

**TABLE IV—CHARACTERISTICS OF ALUMINUM FORGING ALLOYS**

| ALLOY | |
|---|---|
| A51S | Excellent forging characteristics. Higher yield strengths than 25S or 17S. Corrosion resistance comparable to 17S. |
| 70S | Excellent forging characteristics. For intricate contours. Flows more easily than 25S. Fills radial concavities. |
| 25S | Good forging properties. Mechanical properties comparable to 17S but more easily forged. Corrosion resistance inferior to 17S. |
| 17S | Machinability better than 25S. High mechanical properties. Good corrosion resistance. Forging flow resistance high. |
| 14S | Extremely high mechanical properties and hardness. Corrosion resistance comparable to 17S. "W" mechanical properties comparable to 17S-T. |
| 18S | Good performance at elevated temperatures, such as those encountered in piston and engine parts. |
| 32S | Low coefficient of expansion. Good corrosion resistance. Excellent performance at elevated temperatures. |
| 53S | Possess medium mechanical properties. Used where maximum resistance to all types of corrosion is required. |
| R303 | High mechanical properties. Excellent resistance to corrosion. Slightly harder to forge than 14S. |



Two-ton slabs of aluminum alloy are passed through this four-high reversible hot mill until the pressure applied at the rollers reduces the originally thick slab to a thin ribbon of sheet stock. The high pressures, applied to the material at high temperatures, refine the grain structure to such an extent that the physical characteristics of the wrought alloy are much greater than those evident in the cast slab. Further deformation and subsequent heat treatment fully develop the high physical properties and desirable chemical characteristics in the finished product

cessive length of time, diffusion of copper and magnesium into the cladding occurs. When this diffusion becomes excessive the resistance to corrosion is impaired. Pureclad alloys of the duralumin type generally appear stained and show higher than normal mechanical properties when the diffusion is excessive. The presence of stains, alone, however, should not be construed as proof of excessive diffusion.

Many of the heat-treatable alloys either do not respond, or respond very slowly, to natural precipitation after solution heat-treatment. To obtain optimum mechanical properties, within a reasonable length of time, these alloys are subjected to a thermal treatment referred to as artificial precipitation or artificial aging. Alloys such as R301, 14S, 18S, A51S, 53S, 61S, 75S and R303 fall into this classification.

The alloy 14S is somewhat similar in composition to 17S but possesses far greater mechanical properties. A detailed examination of the compositions reveals that the 14S contains more silicon, slightly more copper and less magnesium. The magnesium present has a greater affinity for silicon, forming Al-Cu-Mg-Si, than it does for copper. The copper bearing constituents are, therefore, predominately Al-Cu-Mg-Si and $CuAl_2$ with no Al-Cu-Mg present. The absence of certain soluble magnesium constituents necessitates the use of a thermal treatment to obtain precipitation. The alloy 17S contains $CuAl_2$ as the predominant copper bearing constituent, but enough effective magnesium is present to produce natural precipitation at room temperature.

The alloys 53S and 61S are magnesium silicide hardened alloys and, therefore, require a precipitation thermal treatment to develop maximum mechanical properties. Zinc bearing alloys, such as 75S and R303, must also be artificially aged to obtain maximum mechanical properties even though some precipitation is obtained by natural aging. These alloys evidently obtain their high mechanical properties by the precipitation of two major constituents, one being a zinc bearing and the other a copper bearing constituent.

## TABLE V—COMPOSITION OF ALUMINUM ALLOYS

| ALLOY | SILICON | | IRON | COPPER | | MANGANESE | | MAGNESIUM | | CHROMIUM | | NICKEL | | LEAD | | BISMUTH | | ZINC | TITANIUM | OTHERS | | ALUMINUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Min. | Max. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Max. | Max. | EA. | TOT. | |
| 2S | | | 1.0* | | .20 | | .10 | | | | | | | | | | | .10 | | .05 | .15 | 99.0 min.x |
| 3S | | .60 | .70 | | .20 | 1.0 | 1.5 | | | | | | | | | | | .10 | | .05 | .15 | Remainder |
| 14S | .50 | 1.2 | 1.0 | 3.9 | 5.0 | .40 | 1.2 | .20 | .80 | | .10 | | | | | | | .25 | ‡ | .05 | .15 | Remainder |
| 17S | | .80 | 1.0 | 3.5 | 4.5 | .40 | 1.0 | .20 | .80 | | .25 | | | | | | | *.10 | ‡ | .05 | .15 | Remainder |
| A17S | | .80 | 1.0 | 2.0 | 3.0 | | .20 | .20 | .50 | | .25 | | | | | | | .10 | | .05 | .15 | Remainder |
| 18S | | .90 | 1.0 | 3.5 | 4.5 | | .20 | .45 | .90 | | .10 | 1.7 | 2.3 | | | | | .25 | .15 | .05 | .15 | Remainder |
| 24S | | .50 | .50 | 3.8 | 4.9 | .30 | .90 | 1.2 | 1.8 | | .25 | | | | | | | .10 | | .05 | .15 | Remainder |
| Clad 24S Core | Same as 24S | | | | | | | | | | | | | | | | | | | | | |
| Clad 24S Cladding | | | *.70 | | .10 | | .05 | | | | | | | | | | | .10 | | | | 99.3 min. |
| 25S | .50 | 1.2 | 1.0 | 3.9 | 5.0 | .40 | 1.2 | | .05 | | .10 | | | | | | | .25 | .15 | .05 | .15 | Remainder |
| 32S | 11.0 | 13.5 | 1.0 | .50 | 1.3 | | .20 | .80 | 1.3 | | .10 | .50 | 1.3 | | | | | .25 | .15 | .05 | .15 | Remainder |
| A51S | .60 | 1.2 | 1.0 | | .35 | | .20 | .45 | .80 | .15 | .35 | | | | | | | .25 | .15 | .05 | .15 | Remainder |
| 52S | | | *.45 | | .10 | | .10 | 2.2 | 2.8 | .15 | .35 | | | | | | | .10 | | .05 | .15 | Remainder |
| 53S | 45%-65% of Magnesium | | .35 | | .10 | | .10 | 1.1 | 1.4 | .15 | .35 | | | | | | | *.10 | ‡ | .05 | .15 | Remainder |
| 56S | | 30 | .30 | | .10 | .05 | .20 | 4.5 | 5.6 | .05 | .20 | | | | | | | | | .05 | .15 | Remainder |
| 61S | .40 | .80 | .70 | .15 | .40 | | .15 | .80 | 1.2 | | .35 | | | | | | | .10 | .15 | .05 | .15 | Remainder |
| R301 Core | .50 | 1.2 | 1.0 | 3.9 | 5.0 | .40 | 1.2 | .20 | .80 | | .25 | | | | | | | .25 | | .05 | .15 | Remainder |
| R301 Cladding | .35 | 1.0 | .60 | | .10 | | .75 | .80 | 1.5 | | .35 | | | | | | | .10 | .10 | .05 | .15 | Remainder |
| R303 | **Zinc-Magnesium Type Aluminum Alloy | | | | | | | | | | | | | | | | | | | | | |
| Clad R303 | **Clad Zinc-Magnesium Type Aluminum Alloy | | | | | | | | | | | | | | | | | | | | | |
| R317 | | 1.0 | 1.0 | 3.5 | 4.5 | .40 | 1.0 | .20 | .80 | | .25 | | | .30 | .70 | .30 | .70 | ‡.10 | ‡ | .05 | .15 | Remainder |
| R318 | | .90 | 1.0 | 3.5 | 4.5 | | .20 | .45 | .90 | | .10 | 1.7 | 2.3 | .20 | .60 | .20 | .60 | .25 | .15 | .05 | .15 | Remainder |

*Silicon plus iron. **Same type alloy as Alcoa 75S. ‡Maximum of .25% Zinc and .15% Titanium permitted in Forgings and Forging Stock.

It is likely that these two constituents are Al-Zn-Mg and $CuAl_2$.

The yield strength of many of the wrought aluminum alloys can be raised by subjecting the alloy, in the W or heat-treated condition, to plastic deformation. This treatment is sometimes used when the need for an alloy with relatively high mechanical properties and "free" machining arises. The alloy 11S is often furnished in this condition when it is to be used for automatic screw machine stock, and is denoted by the suffix T3 following the alloy designation 11S-T3.

There are many applications, when additional strength is desired from a particular alloy, where the percentage elongation is not a critical factor. This additional strength can be obtained, with some alloys, by the application of plastic deformation to the alloy in the heat-treated and aged (T) condition.

This process is commercially used with the alloys 17S and 24S. An increase of approximately 5,000 lb. per sq. in in the tensile strength and approximately 10,000 per sq. in. in the yield strength is realized with 24S. The suffices RT and T7 following the alloy designation indicates the application of plastic deformation to the alloy in the T temper.

This type of treatment drastically reduces the percentage elongation and increases the hardness, thereby making subsequent forming operations difficult. For this reason its use is limited to applications requiring no formation after treatment.

### *Plastic Deformation*

Some wrought alloys, particularly the alloys hardened principally by the precipitation of the constituent $Mg_2Si$, respond favorably when subjected to plastic deformation subsequent to solution heat-treatment but prior to precipitation thermal treatment. For example, 61S when subjected to this treatment has higher tensile and yield strengths but lower elongation than regularly produced 61S-T. It is designated by the suffix T8 following the alloy designation 61S-T8.

This treatment is frequently used on 61S seamless tubing where a minimum increase of 5,000 lb. per sq. in. in yield strength is realized. The manufacture of aluminum tubing is such that few additional fabricating procedures and little extra handling are involved when producing this temper.

There are a few special applications, where plastic deformation is employed both preceding and subsequent to the precipitation thermal treatment. This treatment is applicable only to those alloys which favorably respond to plastic deformation prior to the precipitation thermal treatment.

This method of increasing the mechanical properties of an alloy is seldom used; unless some property, such as resistance to corrosion, is a prerequisite. The cost of producing such a temper is generally prohibitive. The treatment is denoted by the suffix T9 following the alloy designation.

The greatly expanded use of wrought aluminum alloys in the production of aircraft demanded products having exceptionally high mechanical properties. At that time the use of the new zinc bearing alloys R303 and 75S was limited, so the practice of double aging 24S was employed to obtain the necessary additional strength.

The double aging treatment is

merely the artificial aging of naturally aged 24S which generally has been subjected to plastic deformation. This treatment gives varying increases in the tensile and yield strengths and corresponding lower percentage elongation, corresponding to the degree of plastic deformation employed.

When plastic deformation, equivalent to a 3.5 percent cold reduction in cross-sectional area is employed, increases in tensile and yield strengths of approximately 5,000 and 22,000 lb. per sq. in., respectively, above normal 24S-T, are realized. When the plastic deformation is equivalent to a 5.5 percent cold reduction in cross-sectional area, the increases in the strength are 8,000 and 26,000 lb. per sq. in., respectively.

Normal 24S-T, produced by solution heat-treatment and natural aging, is generally straightened by stretching or other similar means, the reduction in cross-sectional area being about one percent. Usually this slight amount of cold work is commercially insignificant unless an artificial precipitation treatment is employed. This small amount of plastic deformation greatly increases the yield strength if artificial aging is used and is designated by the suffix T81. If no straightening operation is used in the production of the normal 24S-T, the suffix T80 is employed if the material is artificially aged (24S-T80). When normally produced 24S-T is subjected to the equivalent of a 3.5 percent cold reduction in cross-sectional area and artifically aged, the suffix T84 is used. When the equivalent of a 5.5 percent cold reduction is used the suffix T86 is employed.

### Corrosion Resistance

One of the most important advantageous properties of the aluminum alloys is their resistance to corrosion. The surface of unprotected aluminum oxidizes, forming a tenacious film which prohibits or reduces the rate of attack. It is this feature that gives the wrought alloys their excellent resistance to corrosive attack.

Naturally, some corrosion occurs, especially with the copper bearing alloys where the oxide film is not as resistant, so methods are adopted to control the type and degree of attack.

It is desirable to have corrosion of the general pitting type, since this type exerts the least effect upon the mechanical properties. The intergranular type of corrosion rapidly reduces the effective cross-sectional area and may cause premature stress failures. Other types of corrosion less common to wrought aluminum alloys are interfragmentary, exfoliation and stress-corrosion cracking.

The alloy 2S is widely employed because of its superior resistance to most forms of corrosion. High-purity aluminum is used if additional resistance is required.

The alloy 3S has about the same resistance to corrosion as 2S, when exposed to the atmosphere or to saline solutions. The alloy 52S is more resistant to corrosive attack than 2S when exposed to saline solutions.

### Clad Alloys

The common alloys are generally employed without any protective coating unless they are in contact with other metals. If such contact occurs electrolytic action may take place, causing corrosion, unless necessary precautions are observed.

The alloy 53S is the most corrosion resistant of the heat-treatable alloys, being practically equal to 2S except under some forms of chemical attack. The alloy 61S is less resistant to saline attack but is otherwise about equal to 53S. Unprotected 17S and 24S are inferior to 61S but are resistant materials. Properly produced clad alloys are highly resistant, being as resistant as their claddings.

The alloy R301 is a clad product and is as resistant to corrosion as 61S. Bare R303 sheet appears to be superior to bare 24S-T. Clad R303 is comparable to Pureclad 24S-T.

The resistance to corrosion of the common alloys and many of the heat-treatable alloys is substantially the same regardless of the temper. The alloys 14S, 17S and 24S, however, should never be used in the O or annealed temper because of their susceptibility to intergranular attack.

One objectionable feature of the duralumin type alloys is their occasional lack of resistance to intergranular corrosion. With copper bearing alloys, such as 24S, where the amounts of soluble constituents are high, the quench from solution temperature must be rapid to prevent excessive grain boundary precipitation. If this preferred precipitation is excessive, the corrosion attack will be of the intergranular type.

The precipitate, being $CUAl_2$ or Al-Cu-Mg, is more cathodic than the matrix of solid solution because it contains a higher percentage of copper. The areas immediately adjacent to the precipitate are impoverished or depleted of copper and are anodic to both the precipitate and the rest of matrix. Under proper conditions, especially if there is an electrolyte such as NaCl present, galvanic action occurs, causing corrosion.

This galvanic action will be rapid or slow depending upon the type of polarization present. If anodic polarization predominates, the large area of the grain in contrast to the small area of impoverished matrix produces a high current density at the impoverished area thereby causing the potential to fall, resulting in a slow rate of attack in this area. The corrosion will then be of a more general nature.

If cathodic polarization predominates there is an appreciable amount of current flowing from the relatively large cathodic area to the impoverished area thereby causing a high current density with a rapid attack at the impoverished area. Unfortunately, when uncontrolled precipitation occurs in the high copper bearing alloys, the polarization is generally cathodic, thereby accelerating the corrosion attack.

There is some misconception as to the path of corrosion when intergranular attack occurs in 24S-T and similar alloys. The excessive precipitation forms along the grain boundaries and certain crystallographic slip planes but the impoverished or depleted zones are adjacent to these boundaries and planes. The corrosion attack is therefore along these depleted zones and not between the grain boundaries.

### Effect of Deformation

The resistance to corrosion of 24S-T84 and T86 is complicated by the plastic deformation and subsequent artificial aging. It is a universally accepted fact that plastic deformation produces a condition conducive to preferential precipitation along grain boundaries and certain slip planes. The preferential precipitation is still more pronounced in plastically deformed and artificially aged 24S. It is only by carefully balancing the aging time and temperature that the commerical production of these alloys with acceptable resistance to intergranular corrosion is possible.

Properly produced Pureclad sheet is not susceptible to this type of corrosion, as the cladding is anodic to all portions of the base material, but such products as 24S-T86, if improperly produced and unprotected, have a resistance to corrosion that approaches the absolute minimum of all alloys.

Inside and outside diameters of a stainless steel bushing are chamfered at one end in this "second operation" set-up on a Hardinge turret lathe. Addition of an air cylinder to operate the collet chuck and the use of a specially ground cutter has made it possible to chamfer approximately 2,000 of these bushings in an 8-hr. period. This is several times faster than the production previously obtained when the chamfering operations were performed with hand tools.

# Turret Lathe Replaces Hand Tools In Deburring Steel Bushings

A TURRET LATHE has replaced hand operations in deburring the cut-off ends of stainless steel cowl fastener bushings at the Vultee Field Division of the Consolidated Vultee Aircraft Corporation. Machined from bar stock on an automatic screw machine, the bushings are chamfered at the inside and outside diameters at the cut-off end on a Hardinge turret lathe. Formerly, hand files and scrapers were used to deburr the bushings, which were held in the collet chuck of a Hardinge lathe.

**Broken, four-flute end mills are salvaged and ground into V-notch cutters for the dual chamfering operations on the cut-off ends**

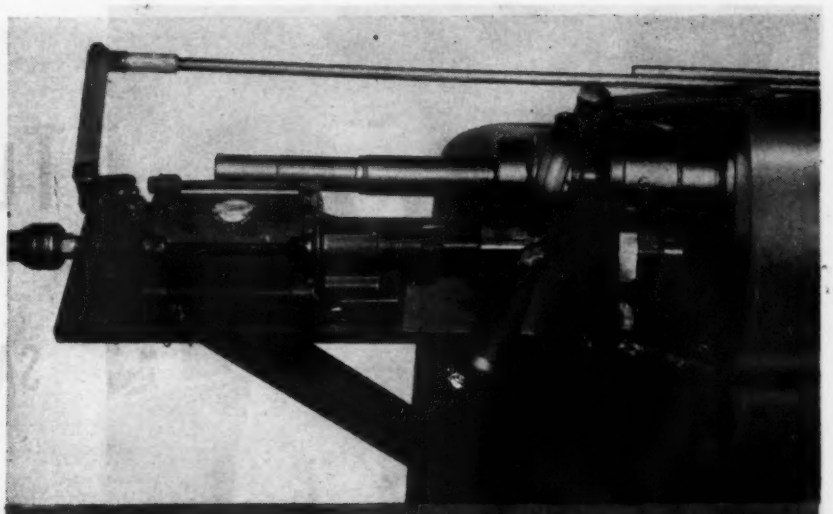
The new operation has increased production and is expected to save an estimated 6,577 man-hours annually. Mrs. Ina M. Skochdopole, operator of the machine, suggested the operation and received the highest individual suggestion award made to a woman at the Vultee Field plant.

As shown in the accompanying illustration, an air cylinder operates the collet chuck actuating lever at the rear of the headstock. A specially ground tool having a V-notch performs the two chamfering operations at the same time. The valve control lever on the Senacon air cylinder is connected by means of a long, adjustable rod to the turret slide, which is located at the other end of the lathe bed.

Forward movement of the turret slide, to bring the cutting tool in contact with the work, actuates the air cylinder to close the collet on the work, which has already been positioned by the operator's left hand. Return of the turret slide, after the chamfering operation has been completed, reverses the air control valve so that it automatically opens the collet in the lathe spindle and thus permits the finished piece to drop into a chute for delivery to a pan at the rear of the lathe bed.

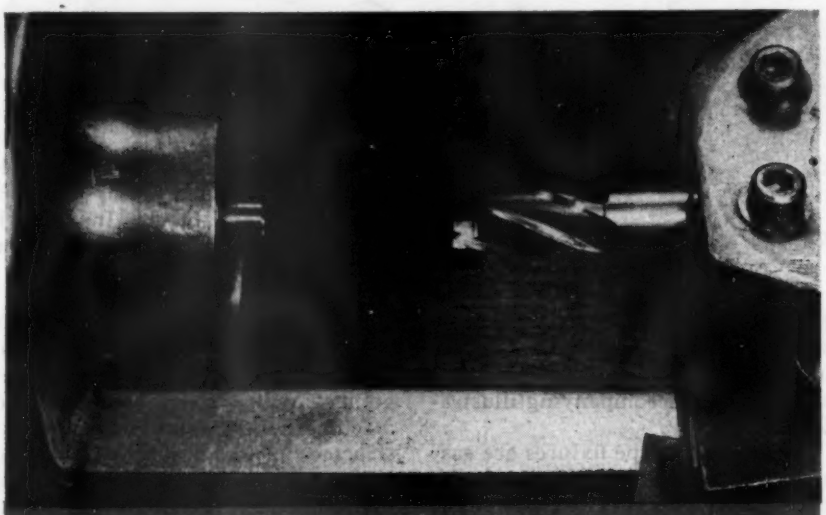
While one bushing is being chamfered, the operator selects another bushing from a pan at the front end of the machine and positions it above the headstock and it is ready for insertion in the collet when the first bushing drops into the delivery chute. Thus, the lathe operator operates the turret slide feed lever with her right hand and positions the bushings in the collet with her left hand.

The air cylinder for operating the collet chuck control lever at the rear of the headstock is mounted on a welded steel bracket bolted to the lathe bed and chip pan. A clevis on the end of the piston rod connects this rod to the hand operating lever originally furnished with the machine. The collet chuck can be operated by hand, if desired. Forward travel of the operating lever is limited by an adjustable stop welded to the cylinder support bracket.



The Senacon air cylinder is mounted on a steel bracket at the end of the lathe bed so that its piston rod is properly aligned with the chuck operating lever to which it is connected. The integral control valve on this cylinder is connected by adjustable rods to the turret slide at the other end of the lathe bed in such a way that actuation of the turret slide automatically causes the air cylinder to open or close the collet chuck

V-notched cutters used for this operation are made from salvaged, high-speed steel four-flute end mills ground to leave one flute extended beyond the body of the cutter as shown in the accompanying illustration. A number of these ⅝ in. diameter end mills had been broken in another machining operation in the plant, so they were available for this use. The notch is ground in the end of the extended flute in proper relation with the center of the cutter body, so that the V-notch is properly aligned with the inside and outside diameters of the workpiece when the cutter shank is properly positioned in the lathe turret. Therefore, no adjustment is necessary once the cutter is clamped in place.



Broken ⅝ in. diameter four-flute high-speed steel end mills are salvaged by grinding away a portion of the body to leave an extended flute. This flute extension is notched to chamfer the inside and outside diameter of the bushing at the time. The lathe spindle is rotated at 250 r.p.m. during this operation

## Two-Cycle Aircraft Engine

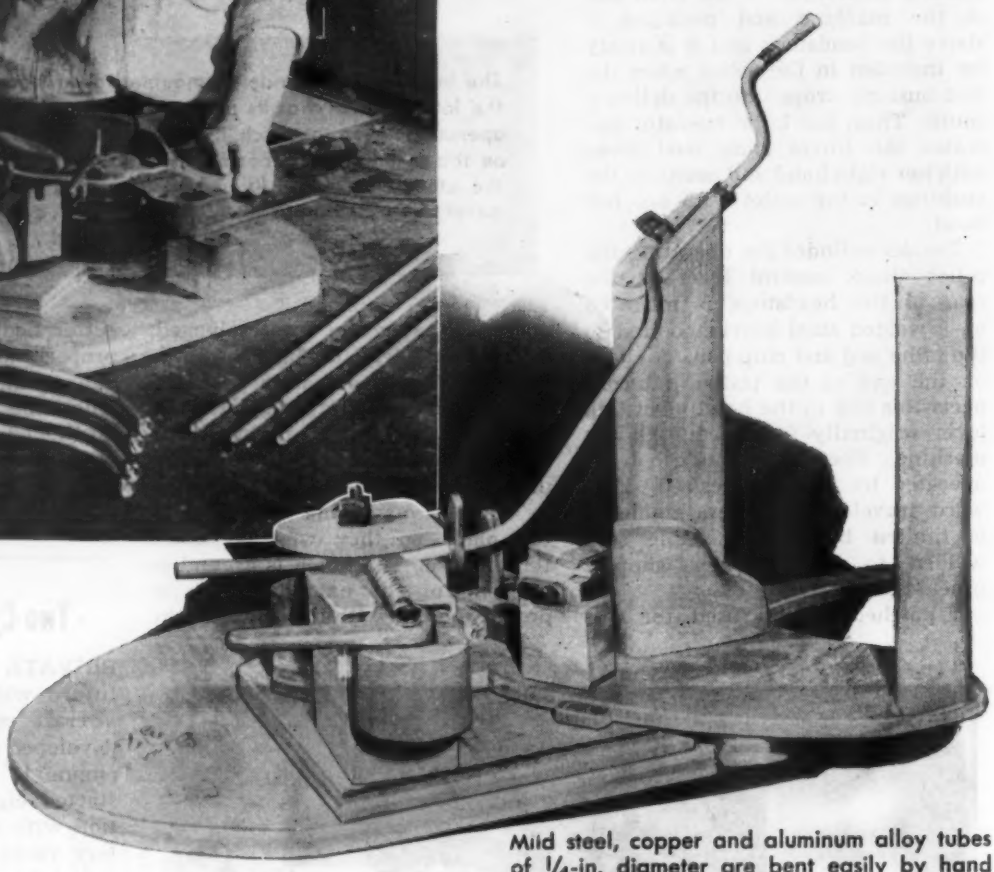
PRIVATE AIR CRUISERS of the future will have available a new aircraft engine, rated at 200 hp., developed by General Motors. The engine is an outgrowth of studies started eight years ago in connection with the development of military robot planes. A four-cylinder radial type, it operates under the two-cycle principle. A supercharging blower increases performance and power reserve for take-off and altitude. There are no valves, this function being performed by the pistons themselves.

The engine is the size of an automobile engine having a piston displacement of only 250 cu. in. but it develops 200 hp. with a high safety factor. It is probably the only small engine having liquid cooling and with a dry weight of only 275 lb. that may be installed for the same weight as an air-cooled engine.

It is only 35 in. in diameter. Fuel consumption is about 13 gal. an hour using 91 octane fuel.

# Inexpensive Tube Benders MADE FROM SALVAGED MATERIALS

Awarded a War Production Board citation for developing inexpensive tube bending fixtures, Andrew Brown, a leadman for North American, is shown working at one of the fixtures. Non-strategic materials are used in their construction



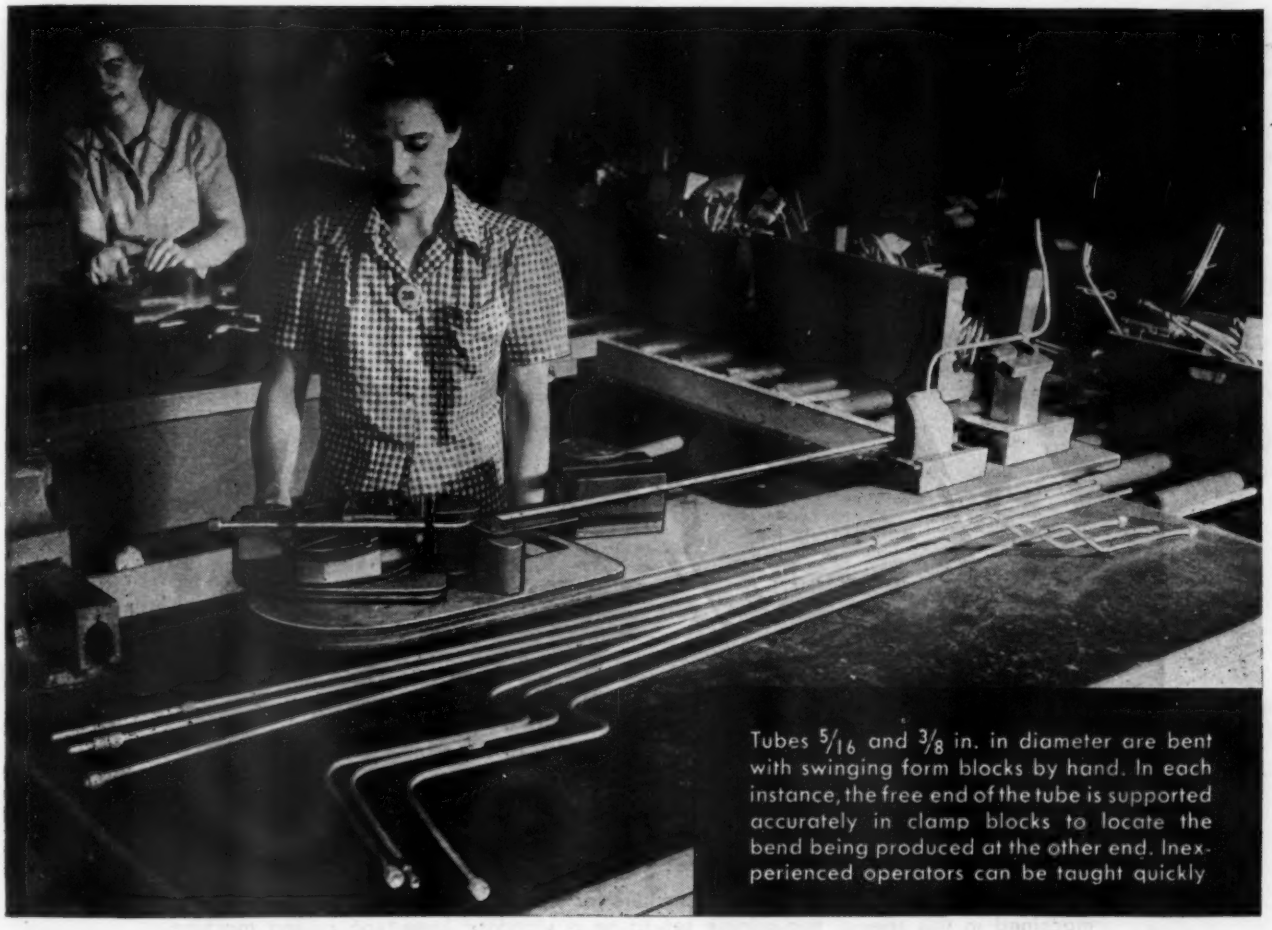
Mild steel, copper and aluminum alloy tubes of 1/4-in. diameter are bent easily by hand against laminated form blocks. The tube is repositioned by the operator after each bend

BY ANDREW BROWN, NORTH AMERICAN AVIATION, INC.

AIRCRAFT production calls for the bending of large quantities of small mild steel, copper and aluminum alloy tubes into many irregular shapes. In the larger sizes, these tubes are formed economically in conventional power tube bending machines. However, large quantities of 1/4, 5/16 and 3/8 in. diameter small tubes which cannot be bent advantageously in these machines are required for the P-51 Mustang fighter planes and B-25 Mitchell bombers which have been mass produced by North American Aviation, Inc., since the war started. Such small tubes are more easily handled in bench-type benders like those shown in the accompanying illustrations.

These bench-type fixtures are easy to use, produce accurate bends in the tubes, and are not expensive to make. Inexperienced production workers quickly can be trained to use these tools. Accurate bends are relatively easy to produce and uniform shapes can be made in large quantities at low cost.

To conserve hard-to-obtain strategic materials, these bending fixtures are made from wood and laminated plastics, and are held together with wood screws and machine bolts. They are easily constructed in the wood pattern shop and it is not necessary to draw up tool sketches. A sample tube bent to the required form is sent to the pattern shop and skilled wood workers there develop and produce the fixtures to suit the required shapes. At times, a single fixture may be developed to bend two or more tube forms by using different positions



Tubes 5/16 and 3/8 in. in diameter are bent with swinging form blocks by hand. In each instance, the free end of the tube is supported accurately in clamp blocks to locate the bend being produced at the other end. Inexperienced operators can be taught quickly

on the same set of forming blocks.

Originally, these fixtures were made entirely of hard maple and plywood from the pattern shop's scrap pile, but it was found that the form blocks, slide blocks and other parts of the fixtures which must withstand the bending pressures would wear rapidly. These parts now are made from hard laminated plastic blocks, also obtained from salvage accumulations. These materials wear well under forming pressures and hundreds of tube forms can be bent in such fixtures without variation from the prescribed tolerances.

The tube is supported in the proper position for making each individual bend, and then the portion of the tube being bent is locked in position with swinging keepers and clamp blocks so that the bend will be in proper relation with the rest of the tube length. Usually, the fixtures are designed so that one bend is made at a time, with the tube being repositioned and reclamped for each of the successive bends.

The fixtures are assembled on plywood baseplates so that they can be stored easily when not in use, and can be clamped to the top of a work bench with a C-clamp when set up for production. This method of mounting the fixtures on the work bench permits them to be set at any required angle to suit the convenience of the operator. This reduces fatigue to a minimum and results in more production with fewer rejects.

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# Surface Hardening Steel With a Resistance Soldering Outfit

BY EDWARD DISKOVICH

THE SAME APPARATUS (transformer, carbon tip and other equipment) used for resistance soldering can be used to surface harden high carbon and tool steels quickly and easily. It can be used to harden the edges of dies which will stand up very well on cold-rolled steel and brass stamping works; also arbors turned from drill rod can be surface hardened by this method without distortion. This process is for surface hardening only.

The procedure is to clip one terminal to the work or vise holding it. Turn on the current to the transformer and simply rub the carbon electrode over the areas to be hardened. Hold the carbon on the metal lightly so as to cause the tip to get red hot. The portion of the metal in contact will be slightly discolored, but not seriously. If the carbon tip is applied to a sharp point it will burn the metal, so care is necessary in using this method.

In practice, this system is successful and in some instances saves time and money. On one good sized die, 5 × 6 × 1 in., it reduced hardening costs, yet this die produced over 1500 pieces from 16-gage cold-rolled steel.

Turbine blades, oil pump blades and packers for steam turbines are, in some instances, machined in this special two-spindle set-up on a standard knee-type milling machine. The special two-spindle head and air-operated holding fixtures were developed by Hendy tool engineers to double production on these stainless steel parts

# Two-Spindle Milling Head Simplifies Grooving of Turbine Parts

BY ERNEST MIEKLEY, JOSHUA HENDY IRON WORKS

MILLING of locking grooves in both sides of turbine blade packing units and on some turbine and oil pump blades manufactured by Joshua Hendy Iron Works has been simplified through development of a special two-spindle milling head and an air-operated clamping fixture made to fit a Kearney & Trecker No. 2-HL plain miller. It has been estimated that the milling head and clamp adds approximately 100 percent to the normal output of blades and packers.

The distance between centers of the two horizontal cutter arbors in the milling head can be adjusted approximately 1/2 in. between a maximum of 4⅞ in. and a minimum of 4⅜ in. This is accomplished by adjusting clamp screws on either side of a lug extending from the unit housing in which the upper spindle is assembled. The housing rotates about a centering plug that is axially in line with the drive gear of the unit. This makes it possible to maintain accurately the center distance between the drive gear and the driven gear on the upper spindle.

**Stainless steel workpieces are held in an air-operated fixture developed by Hendy engineers to increase production of the parts**

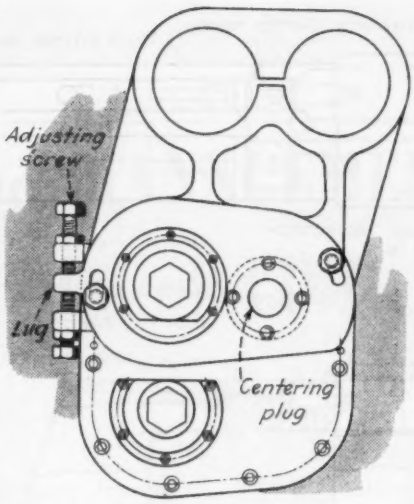
The lower spindle remains fixed in position, and is driven through an idler gear which can be removed

when the lower spindle is not needed. Housing extensions containing needle bearings support both the lower and the upper spindles as close as possible to the cutters to minimize vibration.

The lower spindle arbor is a solid shaft fixed in its longitudinal position. The upper spindle is hollow and carries a stub arbor which can be adjusted longitudinally and then locked by means of a setscrew so that the cutters on the upper arbor can be aligned easily with those on the lower arbor.

Each of the four shafts or spindles in this milling head are carried in two opposed taper roller bearings and the drive shaft extends through the rear coverplate for connection to the main spindle on the milling machine. In some instances this shaft is squared on the outer end for insertion in a square socket carried in the spindle of the milling machine. Or else, the drive shaft has a standard taper on the outer end, as indicated by the dotted lines in the sketch, for connection to the spindle through a standard taper sleeve. All four gears in this assembly are of 8 D.P. with 32 teeth. Each has a 1¼-in. wide face.

The frame casting for this milling head is bored accurately for mounting on the two cylindrical overarms of the Milwaukee milling machine and a clamp stud is provided for locking this frame to the overarms.



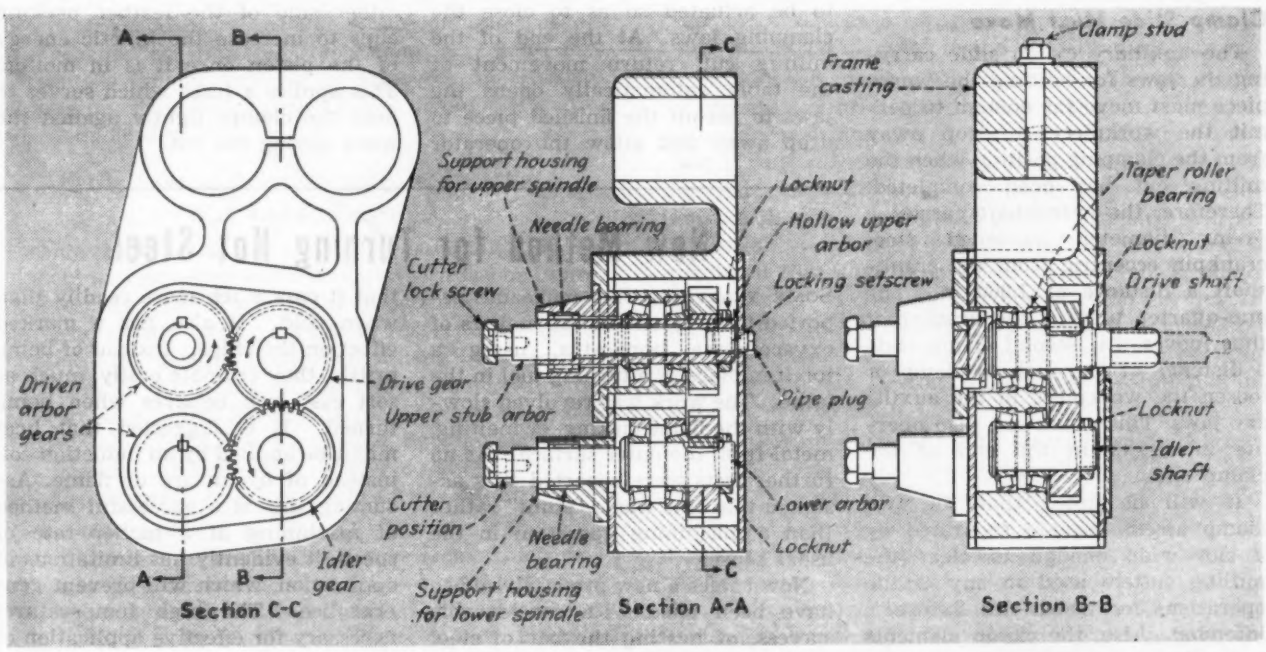

**Adjusting clamp screws on either side of the lug permits changing the distance between centers of the cutter arbors about ½ inch**

Fitted coverplates prevent dirt and chips from entering the milling head, and also avoid leakage of lubricating oil carried inside the head.

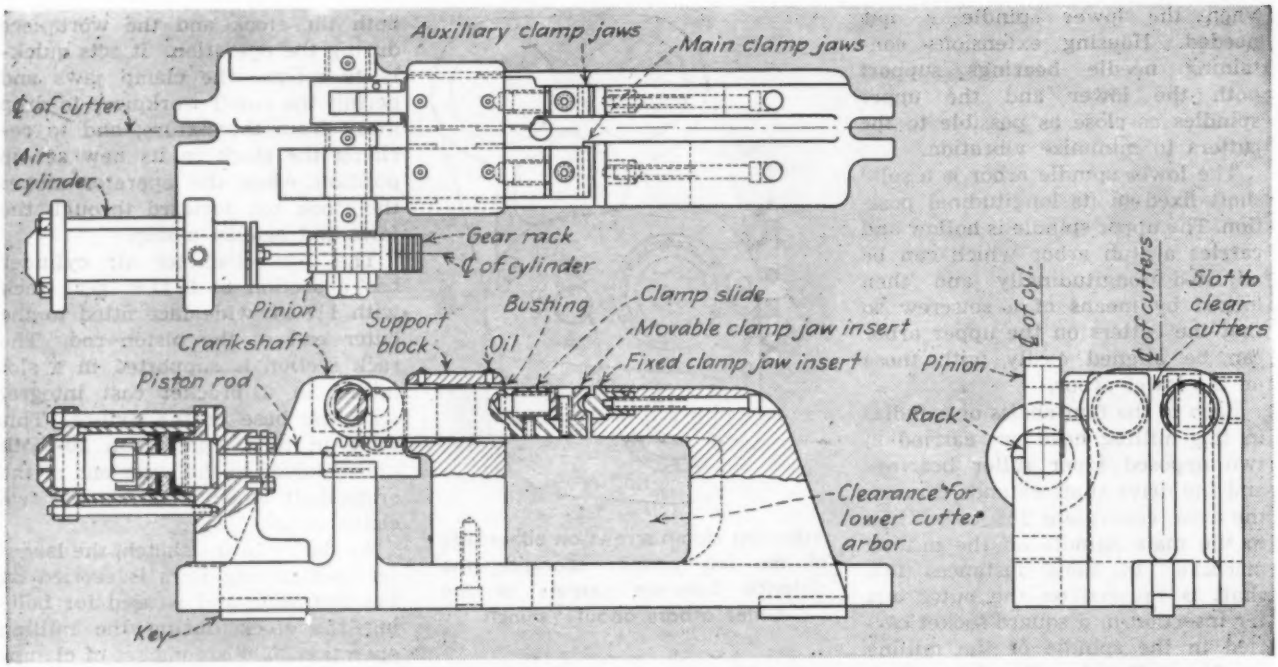
The workholding fixture is of particular interest because it combines cam actuation of the two clamping elements with pneumatic operation of the shaft carrying the clamping cam and crank. As indicated, this fixture has special hardened steel jaw inserts to hold both the stock and the workpiece during the operation. It acts quickly to release the clamp jaws and permit the cutoff workpiece to drop away from the fixture, and to reclamp the stock in its new set-up position when the operator moves the stock bar forward through the jaws and against a stop.

The 2-in. diameter air cylinder has a section of 8 D.P. gear rack with 1¼-in. wide face fitted to the outer end of the piston rod. The rack section is supported in a slot milled in a bracket cast integral with the base of the fixture. This rack, in turn, operates a 20-tooth pinion keyed to the outer end of the crankshaft which operates the two clamp slides.

As shown in the sketch, the larger set of clamping jaws is carried on the first slide and is used for bolting the stock during the milling operation. The second set of clamping jaws is narrower and is carried in the second slide for holding the workpiece as it is cut off the stock bar. Since the only function of the first set of clamp jaws is to hold the stock bar, and only a slight movement of the slide is necessary to loosen or clamp these jaws on the work, the slide is actuated by a 1¼-in. diameter cylindrical section of the crankshaft which is 0.0625 in. eccentric with the crankshaft journals. When the crankshaft is turned one-quarter revolution by the air




**The two milling cutter arbors in this special head are driven at the same speed from a shaft connecting the main spindle of the milling machine. All four gears have 32 teeth and each of the four shafts is carried in two opposed taper roller bearings. Distance between centers of the two arbors can be varied as much as ½ in. When desired, either the upper or the lower spindle can be used alone**




**The cam and crank actuated clamp slides in this workholding fixture are operated from the same 2-in. diameter air cylinder mounted at the end of the fixture. Hardened steel clamp jaw inserts easily are changed for different sizes and shapes of stock. Some of these fixtures are being used for cutting off oil pump blades from 12 percent chromium stainless steel to be used in turbo-generator sets**

cylinder, this eccentric cam on the crankshaft moves the main clamp slide 0.0625 in. longitudinally in the bearings of the support block bolted to the base casting. The eccentric for the main clamp slide fits closely in an elongated slot in the end of the slide to form a Scotch-yoke type of connection.

### Clamp Slide Must Move

The auxiliary clamp slide carrying the jaws for holding the workpiece must move far enough to permit the workpiece to drop away from the clamping position when the milling cut has been completed. Therefore, the crankshaft carries a ¾-in. diameter hardened steel crankpin eccentric from the crankshaft a distance of 1.000 in. The one-quarter turn of the crankshaft thus moves this second clamp slide a distance of one inch to clamp or loosen the workpiece in the auxiliary jaws. This crank can also operate in a slot in the end of the clamp slide.

It will be noted that the two clamp assemblies are separated by a slot wide enough to clear the milling cutters used in any of the operations for which this fixture is intended. Also, the clamp elements extend over an open space in the fixture which provides clearance for the lower cutter arbor on the special milling head described above.

The air cylinder for this clamping fixture can be operated by a hand control valve, or it can be actuated by a valve controlled by stops on the table of the milling machine. When the second method is employed, movement of the table to bring the work toward the cutter automatically causes the air cylinder to be actuated so as to close the clamping jaws. At the end of the milling cut, return movement of the table automatically opens the jaws to permit the finished piece to drop away and allow the operator to move the stock forward ready for the next cut.

To insure adequate clamping of the stock for these milling operations, the piston of the air cylinder is considerably heavier than normally would be used in a cylinder of this size. It will be noted that the piston rod carries extra weight at either side of the leather packing cups to increase the kinetic energy of the piston once it is in motion. This applies a force which serves to hold the clamps tightly against the work during the cut.

## New Method for Turning Hot Steel

SOME YEARS AGO this magazine reported tests by one of the makers of oxyacetylene apparatus, using a torch in place of a turning tool in the lathe. The work was revolved slowly with the flame cutting, or melting, metal from the outer surface. As no further tests were reported it is assumed that this was a "stunt" rather than a machining operation in the usual sense.

Now comes a new proposal, said to have been tried with considerable success, of heating the bar of steel while it is being cut with a high-speed steel or carbide tool. Heat is applied at the back side of the bar by an arc. This softens the steel so that it cuts much more readily than when cold. It also has a marked effect on the chips. Instead of being brittle, they crumble easily, much as soft cast iron behaves when being turned. It is suggested that heat might be applied by an induction coil instead of by an arc or flame. Assuming this is a successful method of machining at a higher rate of speed, it evidently has limitations of application, which will prevent general use. The high temperatures necessary for effective application of this method will undoubtedly demonstrate deleterious results in the physical characteristics and grain structures of the metal.

# LABOR *and* MANAGEMENT MEET — *for* PEACE *or* CIVIL WAR?

THE prospect of a knock-down and drag-out fight in the automobile industry does not augur well for the reconversion outlook, which upon every other score is bright. Any widespread outbreak of the type of industrial warfare which now threatens will disrupt, more thoroughly than anything else on the horizon, an orderly transition to a peacetime economy.

It is doubly unfortunate that there should be a general tightening of union and company battle lines upon the eve of the Labor-Management Conference, which on November 5th will convene at President Truman's direction for the purpose of "working out by agreement means to minimize labor disputes." If the current work stoppages occasioned by industrial conflicts should increase rather than diminish between now and November first, the Conference atmosphere hardly promises to be favorable to a dispassionate examination of basic issues.

Yet the shadow of the threatened industrial storm that hangs over the Conference only serves to emphasize the importance of reaching satisfactory agreement upon two problems with which such a Conference might deal. The first is that of determining what machinery shall be used for settling disputes upon which employers and workers have reached an impasse. The second, and more far-reaching, is that of arriving at some common understanding upon the major issues which commonly lead to irreconcilable disputes.

### Settlement of Wartime Disputes by the War Labor Board

During the war the first problem was handled largely by machinery centered in the National War Labor Board. Supported by general adherence to patriotic pledges by labor leaders and employers not to resort to the use of economic force against each other during wartime, and backed up on rare occasion by use of the President's power to seize plants for war purposes when its orders were not obeyed, the Board managed, by what amounted to compulsory arbitration, to settle the nation's wartime labor disputes with relatively little economic loss.

But it can scarcely be claimed that the War Labor Board did much to resolve the issues from which disputes grow. Indeed, the fact that it was available to issue orders in cases which the Secretary of Labor certified as likely to "lead to substantial interference with the war effort", resulted in the conversion into full fledged disputes of many disagreements which would otherwise have been settled at a local level in the course of collective bargaining. Meanwhile, local collective bargaining machinery which should have been doing most of this work was neglected, and will need thorough reconditioning even to be brought back to its prewar level of effectiveness.

With V-J Day came an abrupt change in the status of the War Labor Board. One of its main props, labor's "no strike pledge", was promptly withdrawn. It could no longer rely on the President to use his power to seize plants for war purposes to force obedience to its orders. Consequently the Board agreed that it would accept new cases only if both parties to the dispute stipulated in advance that they would abide by the Board's findings, that it would clear its dockets of old cases as rapidly as possible, and that it would then go out of business, leaving to the Labor-Management Conference the question of what should take its place in the postwar period.

### What Shall Take the War Labor Board's Place?

The immediate and pressing task of the Labor-Management Conference is to agree upon machinery for settling industrial disputes in the peacetime economy.

Neither management nor labor wants the continuation of compulsory arbitration to which they submitted as a necessary war measure. But it must be clear to everyone that if any substantial proportion of the disputes that inevitably arise are settled by resort to strikes and lockouts, economic anarchy will result. Not only will it be impossible to achieve the high levels of output and employment that have been set as postwar goals, but it is questionable whether our economy could survive. The only alternative to compulsory arbitration under government auspices is for management and labor to demonstrate their ability to effect a peaceable resolution of their differences without it.

The most obvious need is to set up local machinery at the grass roots where disputes originate. That is where most of them should be settled by local negotiation and, when that fails, through voluntary submission to mediation or arbitration under terms of reference to which the parties agree. Many issues, which at plant level are relatively simple in character, are blown up to formidable dimension and complexity when they are passed along

the line for decision in Washington. The centralizing process is one that frightens everyone connected with it because it focuses attention upon the possible importance of precedents established by a decision, rather than upon resolving satisfactorily the particular dispute at hand.

Unquestionably, some Federal machinery must be provided which may be called upon in cases where the size or implications of a threatened dispute clearly run beyond local jurisdiction. That will mean the thorough revamping of conciliation and mediation machinery which exists, but which has grown rusty through disuse while compulsory arbitration was the order of the day.

At least, this involves a complete overhauling of the United States Conciliation Service with a noteworthy strengthening of its personnel. There may be wisdom also in recently advanced suggestions for the creation of a board of arbitration to act in cases voluntarily submitted by the parties concerned, and for boards of inquiry to make reports upon the merits of disputes in which the public interest is concerned. But there is valid ground for questioning what appears to be the common assumption that such machinery should be located in the Department of Labor. It belongs neither there nor in the Department of Commerce. For the work which such agencies are called upon to perform, both the appearance and fact of complete impartiality are essential to effective performance. Assurance of impartiality will not be fostered by placing them in a department specifically charged by Congress with the task of advancing the interests of wage workers.

### Resolving the Issues Over Which Disputes Arise

It may be, as many think, that the forthcoming Labor-Management Conference cannot effectively handle any problems beyond the procedural ones suggested above. If that is true, its agenda probably should be restricted to planning the reconstitution of collective-bargaining and dispute-settlement machinery, in view of the urgent need for putting it in working order.

But either in this Conference, or in subsequent ones, there will have to be an attempt to reach a reasonable measure of labor-management accord upon certain basic issues over which most industrial disputes originate. The best of machinery can be swamped if disputes are generated in ever-increasing number.

Most important of such issues is that of the fair determination of wages. There is clear need for reaching agreements at least upon the major factors on which such determination should rest. It seems evident that if we are ever to hope to reach the high levels set and generally accepted as postwar goals, we must harness economic incentives to promote production efficiency. That means that workers, as well as management, must be given a genuine stake in increased productivity. No universal formula is possible, but we should be able to agree upon general principles for dividing returns derived from improved performance in output between workers and investors, and consumers in the form of lowered prices.

Again, since unionism is here to stay, general acceptance by management of the principle of collective bargaining would save innumerable disputes which are concerned more with the method of negotiation than with the concession sought. Few in management still question the validity of the collective bargaining process as such, but there are many matters to be resolved of which the question of the open shop, the union shop, or the closed shop is merely a conspicuous example, upon which there is wide divergence of conviction between and within labor and management groups.

On the management side, there is sincere concern about the intent or ability of union leaders to exercise responsible control that assures compliance with contractural obligations. Wild-cat strikes are of sufficiently frequent occurrence to give substance to this distrust, and union discipline seldom has been administered in a decisive or effective fashion. The prospective rivalry of three competing labor organizations of national scope gives management little confidence that a bargain made and kept in good faith with any one of them provides assurance against work stoppages.

All of these matters, and many others, need thrashing out between management and labor, with the view of arriving at as large a measure of specific and detailed agreement as can be achieved. The greater the area of such agreement, the smaller will be the area for disputes that must be handled by settlement machinery, or put to the final test of force.

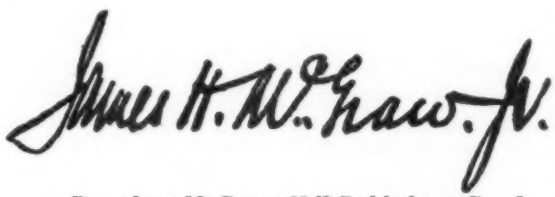
### Peace or Civil War in Industry

The Labor-Management Conference is of major importance to national welfare. It is important even if it restricts its objectives to the procedural problem of how industrial disputes are to be handled.

It can make an even larger contribution if it lays the groundwork for an attempt to reach working agreements upon such policy issues as have been cited above.

Neither management nor labor can afford to lend anything less than their best intelligence and effort to an attempt to arrive at common understanding. Success will mean that we have a genuine chance of reaching new levels of economic well-being. Failure will mean industrial civil war, in which the casualties will be high. One almost certain casualty of such a war will be the principle of collective bargaining, since the Government can scarcely refrain from establishing compulsory arbitration if sufficient breakdown occurs.

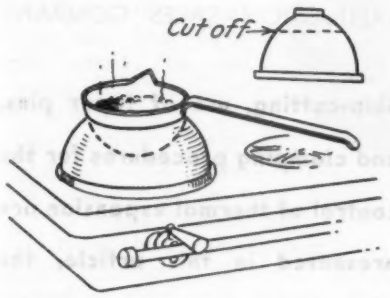
It is to the vital interest of both management and labor to demonstrate that they can responsibly control themselves.



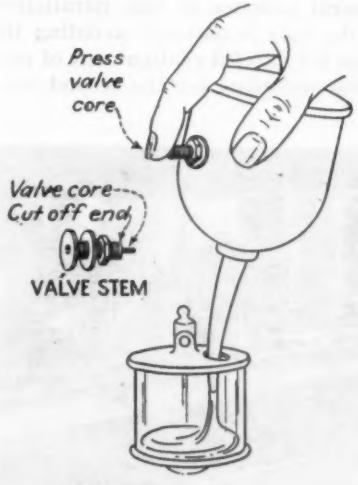
*President McGraw-Hill Publishing Co., Inc.*

# Short Cuts FOR THE SMALL SHOP

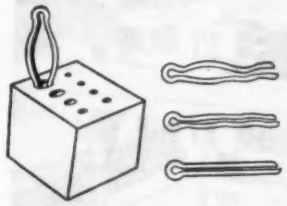
BY A. H. WAYCHOFF




BABBITT ladles are much safer and more comfortable to work near when supported in a heat conserver made from an old automobile-headlight shell. Cut away the top of the shell to hold the ladle support, being sure to notch the opening to receive the ladle lips. In use, the shell conserves heat, speeds up melting by throwing the heat where wanted, and makes a good stand where a full ladle can rest without danger of tipping and spilling molten metal.

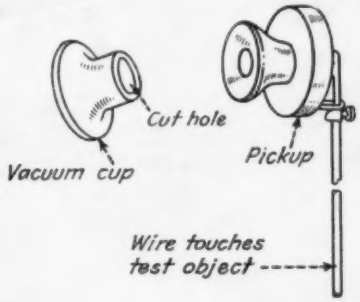


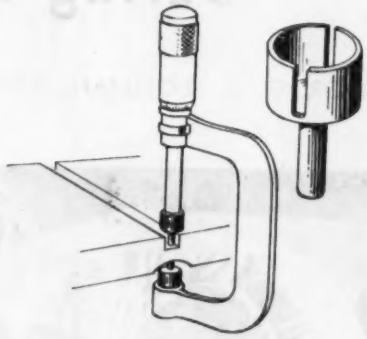

OIL CANS can be made to deliver a faster flow of lubricant when desired, by installing a common tire-valve in one side. Take a bicycle-tire valve of the type having a nut on each side of the tire wall. Cut off part of the stem so that the valve-core plunger is well exposed, say 3/16 in. Drill a hole in the side of the oil can, drop the valve stem into the can and pull the free end through the hole. Run on the outer nut and tighten so that the assembly is leakproof. Now when filling large cups, press lightly on the valve core to admit air to the can, whereupon the oil will flow much faster than by laborious hand pumping. If the oil can is to be used for other oiling about the machine, the tire valve will not interfere with the regular snap pumping action.



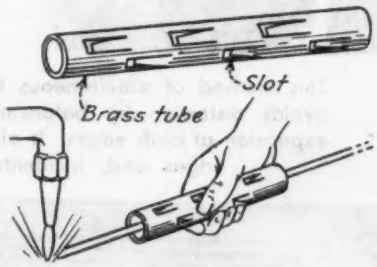

BENT COTTER PINS are easily reclaimed by use of a steel block into which a number of holes of assorted sizes are drilled and countersunk. A block about 2×2×2 in. will suffice. To reclaim a badly bent cotter pin, first drive it into an oversize hole, then into a hole which is a snug fit. The second driving will usually result in a cotter pin which is practically as straight as new. A cotter-straightening block saves time and expense as compared with searching for a new cotter pin.

ACOUSTIC TROUBLE FINDERS can be made from old phonograph pick-ups. Fasten a piece of stiff wire in the needle holder. Then cut a hole in the shank of a rubber vacuum cup and slip onto the horn-attaching tube of the pick-up. This completes the outfit. To find the slightest knock, scraping or grinding noise in equipment, put the end of the wire against the suspected point of the mechanism and listen at the vacuum cup.



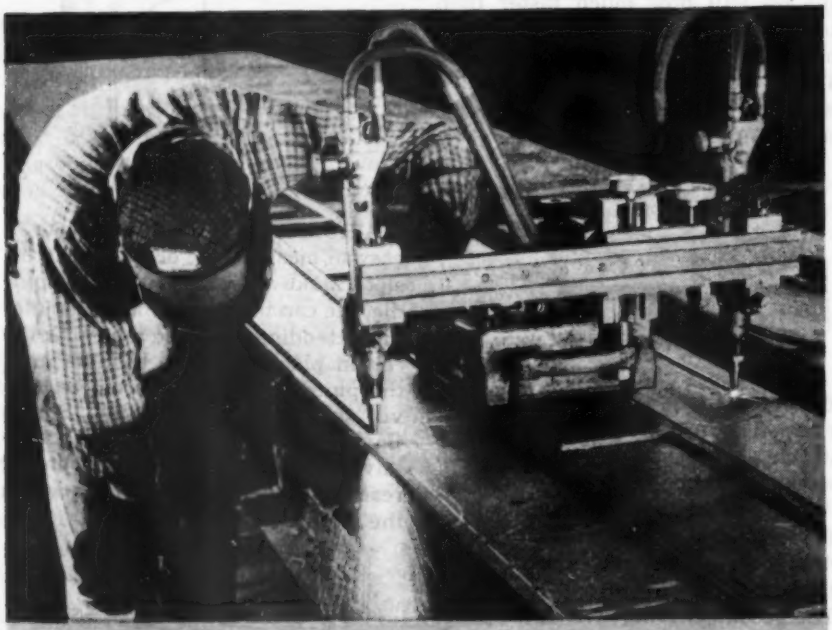
MICROMETER extensions make it easy to measure the depth of narrow slots. Make a cap to go over the spindle, the cap to have a small-diameter pin extending from the top. With the cap in place, turn the thimble until the pin contacts the micrometer anvil, then note the reading. Sometimes, a cap must also be used on the anvil. In either case, the proper reading is taken into account when the slot depth is measured.




WELDING-ROD HOLDERS of the commercial type may not always be satisfactory when a straight type is wanted. To make one that can be held comfortably in the hand, proceed as follows. Get a piece of ⅜-in. or larger brass tubing about 6 to 8 in. long. Drive an iron rod into the tube. Then with a chisel cut a series of U-shaped tongues by making a cross cut about 3/16 in. long and two side cuts about ⅜ in. long. Remove the rod and force the tongues inward. When the welding rod is pushed into the holder from the end opposite the tongue ends, it will be gripped securely at the desired location, because the tongues have a spring action. And the rod can be fed forward as desired. Air is able to circulate in the tube and keeps the holder cool enough for comfortable handling.

# Methods for Controlling Plate Motion During Flame-Cutting Operations

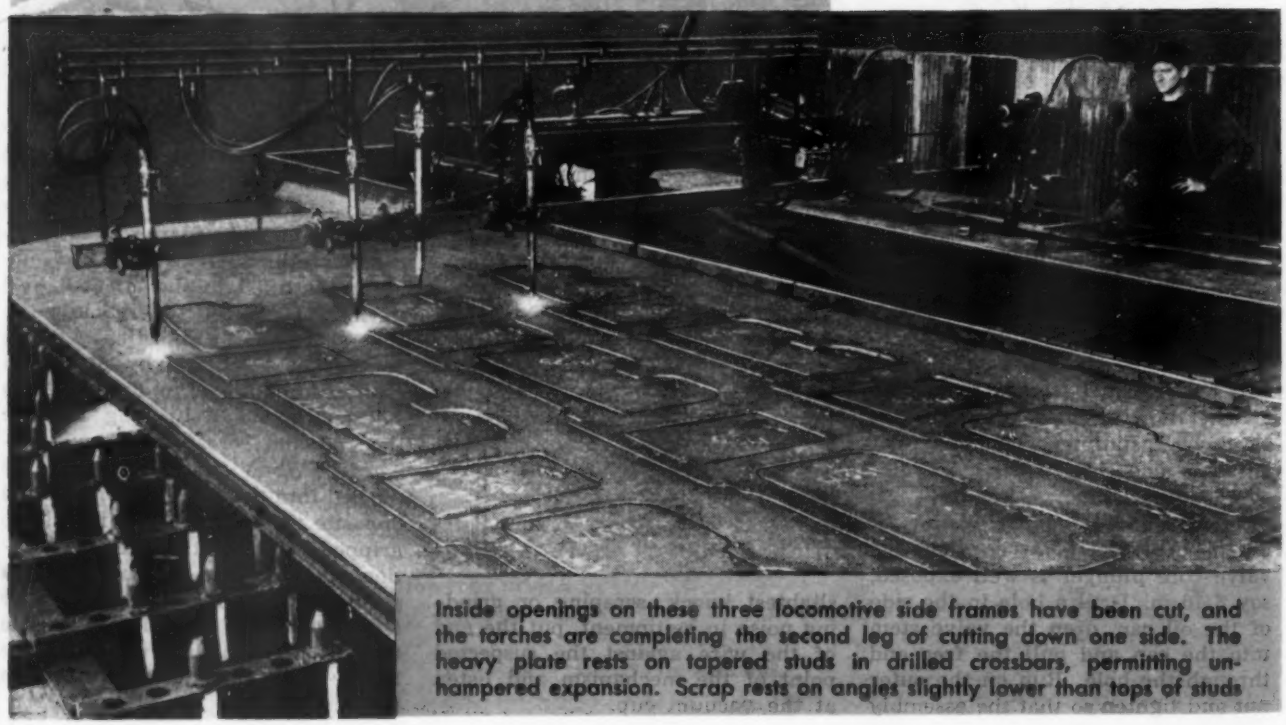
BY DR. G. V. SLOTTMAN, APPLIED ENGINEERING DEPARTMENT, AIR REDUCTION SALES COMPANY



This method of simultaneous trimming of both edges of a plate avoids distortion by balancing the heat input and consequent expansion at both edges. It also insures parallelism of the finished edges and, incidentally, increases production

**Skip-cutting, use of taper pins, and clamping procedures for the control of thermal expansion are presented in this article, the seventh in a continuing series**

WHEN parallel cuts are to be made, as in trimming opposite edges of a piece of material, the effects of expansion can be controlled by making both cuts simultaneously, thus preventing rotative creep. The so-called plate squaring machines are based upon the principle of making opposite cuts simultaneously, in which two ripping cuts are made by a Radiagraph with a 24-in. cross bar. An incidental advantage of this general practice is that parallelism of the cuts is assured, avoiding the need for careful realignment of machine and plate for the second cut.



Inside openings on these three locomotive side frames have been cut, and the torches are completing the second leg of cutting down one side. The heavy plate rests on tapered studs in drilled crossbars, permitting unhampered expansion. Scrap rests on angles slightly lower than tops of studs

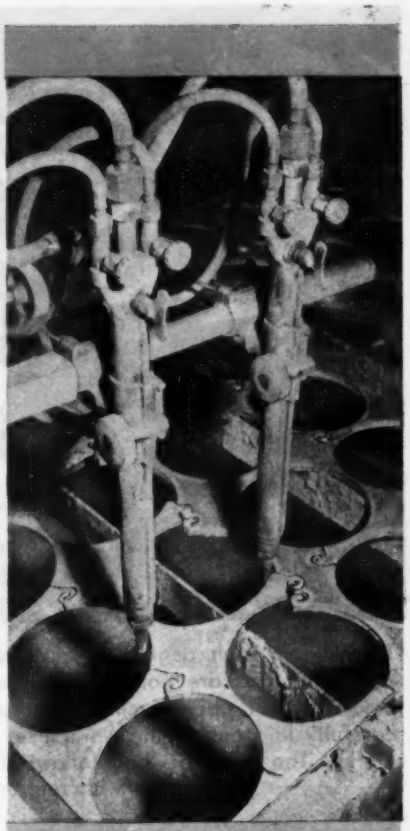
A practice used when opposite cuts cannot be made simultaneously is to leave the ends of the piece uncut when making the first cut—in other words, to start the cut an inch or two in from the edge and interrupt it a few inches before completion. The second cut is made in the same way, thus counterbalancing the stresses set up by the first. The short uncut ties are severed after the piece has cooled.

This practice of skip-cutting is quite commonly applied in a more general way to control distortion which arises from the upsetting and consequent contraction of metal along the face of cut. It is effective because it restrains the upset edge from shortening upon cooling, forcing most of the contraction to work itself out in plastic deformation before the finished parts are fully severed. Sometimes short ligaments are left in the midsection of a long cut, as well as at the ends. These may be only 1/2 to 1 in. long. Such ties should not be cut until the entire piece has cooled.

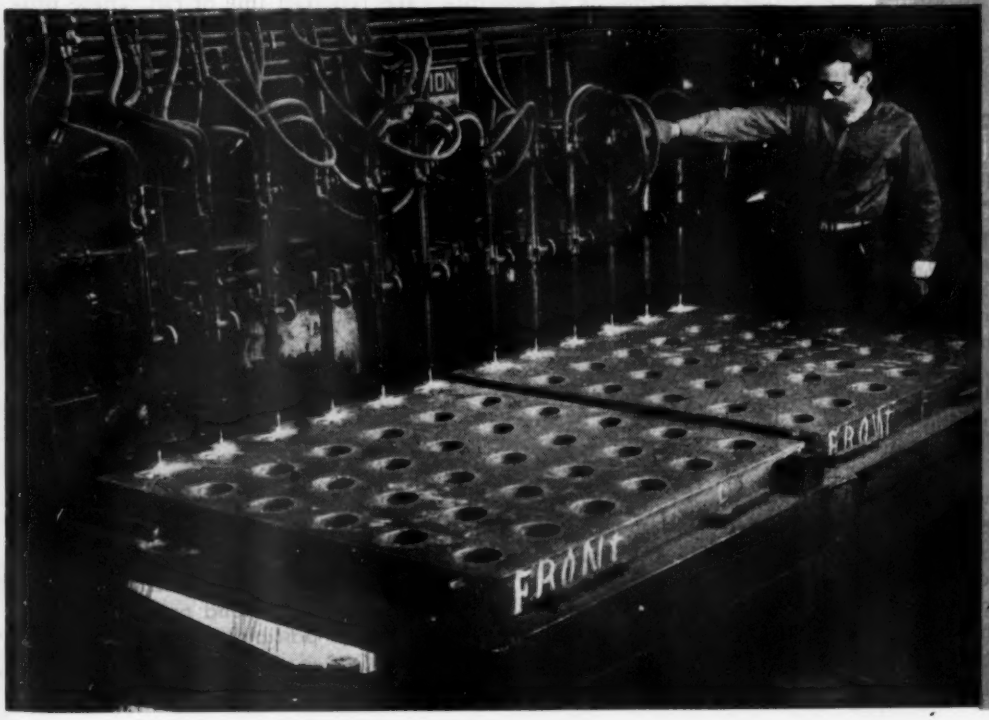
The use of uncut ligaments and a controlled sequence of cutting, in conjunction with the free-movement method of work support, is shown in accompanying illustrations. Cutting sequence involves three main stages: first, the interior openings; second, main profile cuts; third, final separation. The openings, being closed cuts in which heat input is distributed equally across the width of the plate, involve negligible plate motion. Profiling requires a full traverse of the plate from one end to the other, and back. Since the locomotive side frames being cut are about 32 ft. long, each traverse is made in two steps, leaving uncut ties at the center and at both ends. Separation is then done with only one torch operating, cutting first the center ties on all three pieces, and then the end ties. This procedure resulted in extremely accurate cutting of these large parts.

When starting at an outside edge to cut a shape from a piece of stock, the starting point should be chosen with consideration of the fact that thin sections of scrap are more likely to creep than the main body of the plate. The starting point and the direction of travel should be such that the last leg and the finish of the cut will be on the main body. If this precaution is not observed, the desired part will begin to move with the scrap during the return cut, and will be quite inaccurate upon completion.

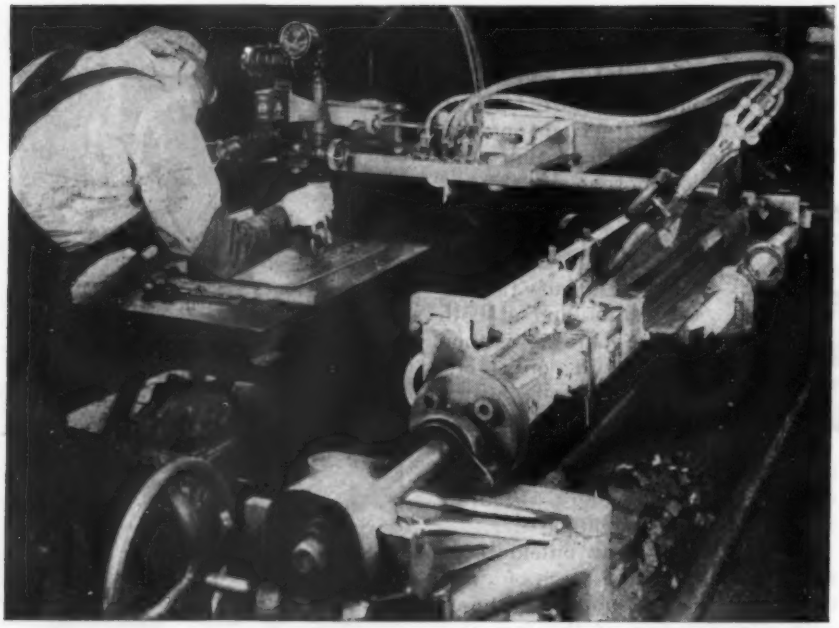
Thin taper pins or wedges are sometimes inserted in the cut behind the torch as a means of controlling movement. Their usefulness can only be determined by the shape of the particular piece being cut and by the presumed or known action



**Interlocking of scrap between successive cuts prevents movements of scrap which would tend to cause inaccuracies in the disks being cut. This technique is frequently applied between outside edge and first cut to hold scrap virtually immobile when its crawling might draw the workpiece out of position**




**These plates are blocked at front and side to force all thermal expansion to progress in desired directions. The expansion is taken into account in the spacing of individual templets for each row of holes, so that the rows are spaced equally in the finished piece. The 12-torch oxygraph cuts two plates at once, using a magnetic tracer**



To insure a high degree of accuracy in locating small openings on this piece, the cuts are not made during profile cutting of the parts of the assembly, but upon semifinished weldment. Prick punch marks are then carefully laid out on the workpiece, and the templet is aligned with these marks. The operator then follows the templet and observes the progress of the cut with reference to the punch marks

of the scrap. They may, in some instances, be used between scrap and work to force the work to retain its position without creeping. In other cases their purpose may be to prevent walking scrap from locking onto the work with a tendency to pull it out of true position. However, it is often more desirable to prevent such interference on the part of the scrap by cutting off the sections which are likely to offend. A hand torch is used for this work during the progress of the machine cutting.

### Scrap Locking Technique

Another technique for controlling movement of scrap and thereby promoting accuracy is to "lock" the scrap to itself. This is done by introducing an S curve into the cut where it leads from an outside edge to the main workpiece, making in effect a closed cut without free scrap. The insertion of a taper pin into the kerf at the S will prevent even the slight amount of movement permitted by the width of kerf.

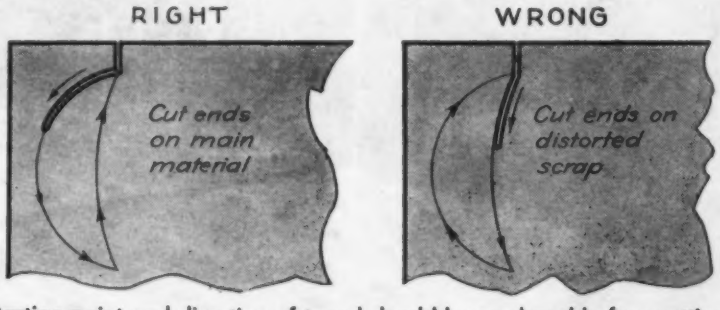
Rigid clamping of the workpiece at several points is generally inadvisable if its purpose is to prevent plate motion, because the expansive forces involved are enough to cause buckling, or shifting of the clamps. It should be remembered that except where a single central clamp can be used, clamping is essentially contradictory to the desirable condition of freedom of plate motion. This is as it applies to large plates. Small pieces can be clamped, frequently to good advantage, particularly when individual jigs are employed.

There are, however, special occasions when clamping of one edge of a large workpiece is resorted to deliberately as a means of controlling plate expansion in one direction. For example, a large quantity of square plates were to be perforated with six rows of holes, six holes in each row, all accurately spaced. A multiple-torch Oxygraph was used in conjunction with six individual templets—one for each row of holes to be cut. The plates were butted up against stops at the front, and cutting was begun at the front, moving progressively toward the rear. The six templets were spaced progressively farther apart toward the rear, to compensate for cumulative rearward expansion of the plate as the heat input became greater with each successive row of cuts. These positions were determined by trial, and the result was that each row of holes was exactly in its prescribed position in the plate.

### Start Cuts at Free End

Another method of performing the same type of job is to start the cuts at the free end of the plate, opposite the stops. It will then not be necessary to provide slightly greater increments of space between sections of the templet because expansion will be confined almost entirely to the finished cut portions of the plate, leaving the uncut portions in almost exactly their original positions. Movement of plate behind the torch, provided it is in the general line of cutting as in these cases, is harmless. It is the movement ahead of the torch which must be circumvented.

Where it is necessary to locate a cut in exact position with relation to a finished plane or other line of reference, it may be desirable to scribe the workpiece directly by making prick punch marks along the required line of cut. These provide a check to which the templet can be located for each cut, and as a guide to the operator during cutting. Such reference points are




Starting point and direction of travel should be analyzed before cutting is begun, to make sure that the desired piece will not move with the scrap, as it would during conclusion of cut at right. Sketch at left shows correct cutting of this piece. The cut should end on the main body of the plate whenever possible

particularly helpful when a precision cut is being made on a semi-fabricated part or assembly.

In the foregoing discussion, only those techniques were presented which are susceptible to practical application in production work, and which have proved themselves in such work. A random sampling of representative work done in one plant where the recommended controls have been applied, shows that the results justified the means. Accurate measurements of parallel sides on various flame-cut shapes were tabulated, and a summary of the results appears herewith. It was found that a tolerance of ± 1/32-in. covered all but one dimension, while ± 1/64-in. covered over half of the measurements. The procedure at this plant does not sacrifice production speed for accuracy. All equipment is kept in good condition, operating procedures are carefully applied, templets are kept in good order, and all plates are mounted on rounded stud supports.

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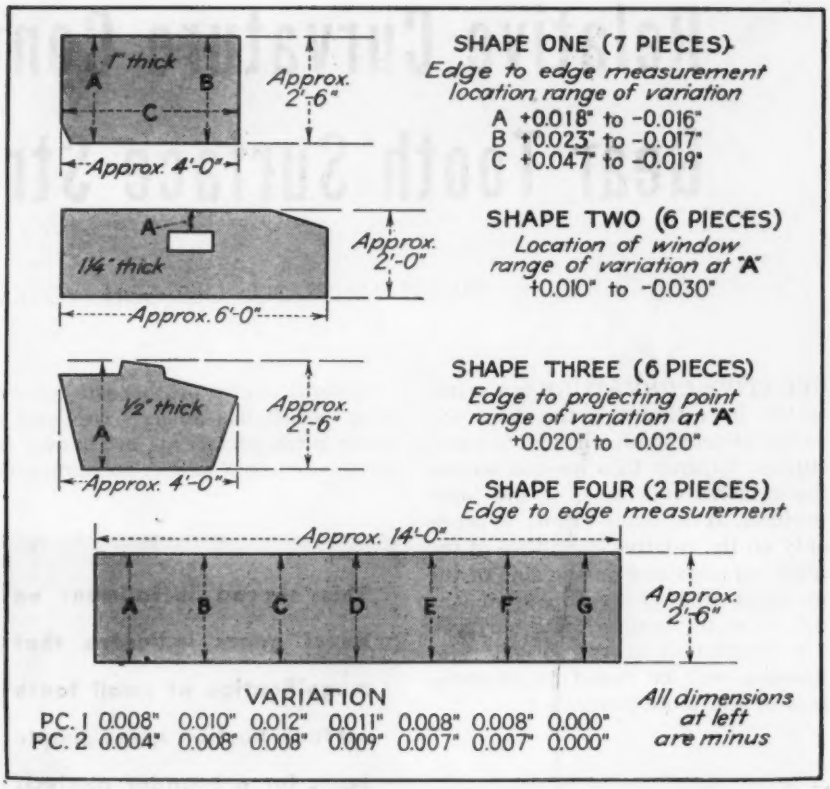
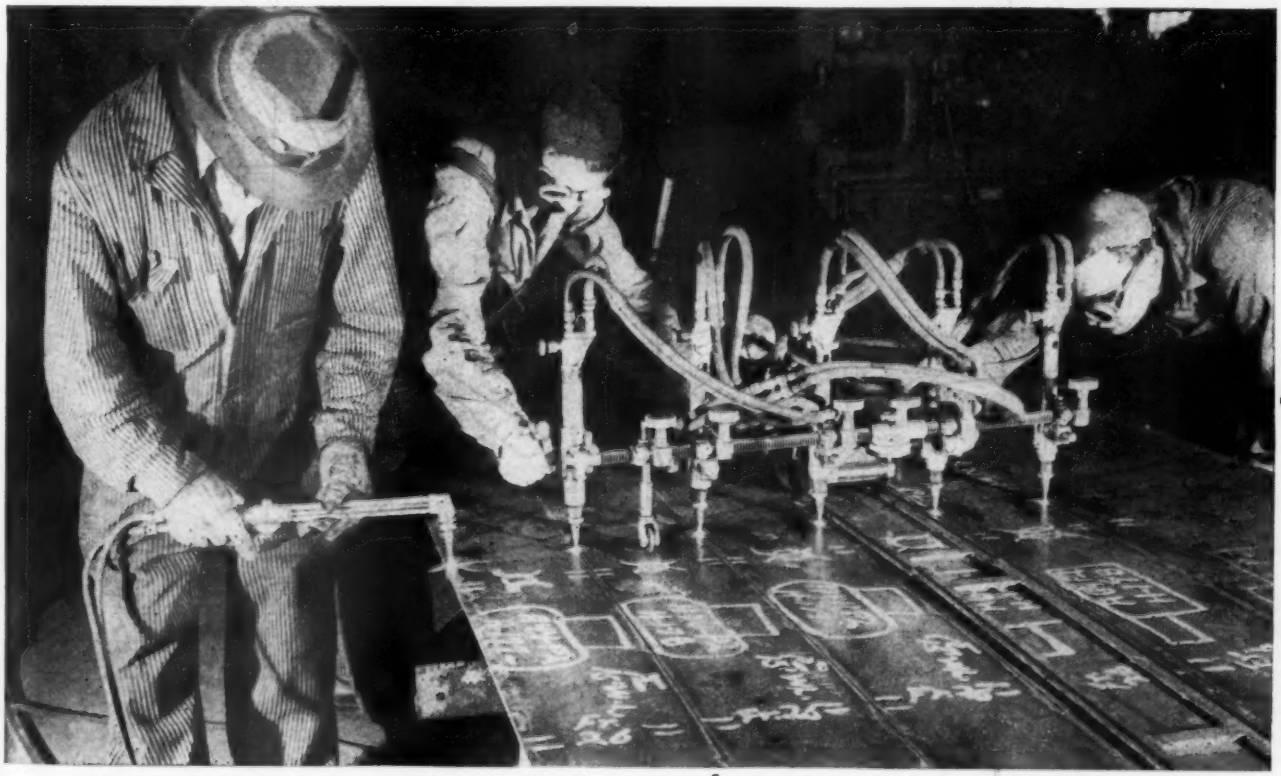
*The next article in the series will take up the designing of templets for manual and automatic tracing. Methods of multiple templeting will also be discussed.*

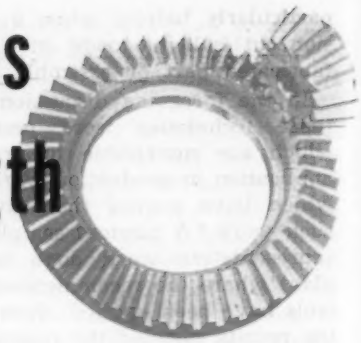



**Summary of measurements of accuracy of cutting done in regular production work at a shop where precision is striven for, but not at the expense of speed. These results prove that the precautions for accuracy described herein are highly effective**



**An interesting application of the principle of counterbalanced heat input as a means of avoiding distortion. Multiple torches on a Radiagraph split a wide platen into narrow strips, while the preheat flames of a hand torch are played along the free edge to preserve the alignment of the outermost piece being cut. By making all cuts at once, camber is avoided**

# Relative Curvature Controls Gear Tooth Surface Strength



BY ERNEST WILDHABER, GLEASON WORKS

**This second installment on bevel gears indicates that magnification of small tooth surface portion gives simple basis for a broader analysis**

RELATIVE CURVATURE is a prime factor in estimating the load capacity of gear tooth surfaces to avoid surface failures. In a normal section the relative curvature of the tooth profiles, at a pitch point, depends only on the relative curvature of the pitch surfaces and on the sine of the pressure angle, regardless of the nature of the mating tooth surfaces. The derivation of this broad relationship will be based on observation of the tooth normals.

Several teeth of a basic crown gear, which has an axis $OC_o$ and a plane pitch surface $p_x$, are shown in perspective in Fig. 8. A meshing pinion is indicated by its pitch surface $p$ and its axis $OC'$. The tooth sides of the crown gear shown are conical surfaces. Side $S$ contains mean point $P$ and has an axis $c$, which coincides with the cutter axis during generation and, in this case, is parallel to the crown gear axis.

Tooth side $S$ contacts the mating tooth side of the pinion along a line of contact $I$, which is the normal projection of the instantaneous axis $OP$ to the conical surface $S$. During

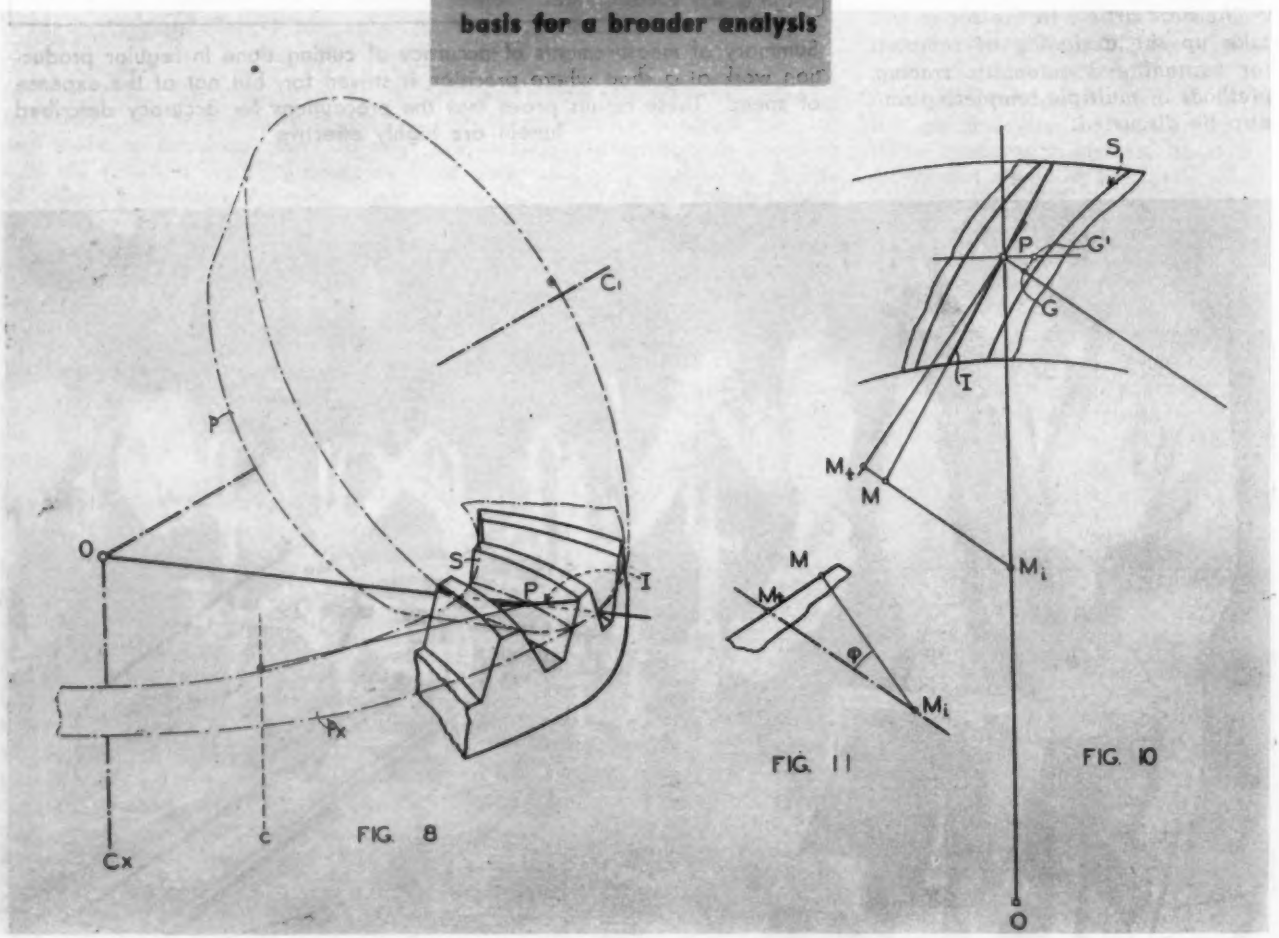



FIG. 8

FIG. 11

FIG. 10

Fig. 8—Gear tooth surfaces can be derived from a basic crown gear, whose tooth surfaces are of simple shape. The instantaneous line of contact *l* is the projection of the instantaneous axis to a tooth surface

Fig. 10 and 11—Instantaneous gear contact is along a line *l*, inclined to the pitch line. Here the inclination of the line *l* to the pitch line and to the instantaneous axis can be computed

generation of the pinion the rotating cutter which describes tooth side $S$ is moved about the axis of the crown gear $OC_z$ and the pinion is turned on its own axis as if meshing with the crown gear. A grinding wheel can be used in place of a milling cutter, if so desired. A generating grinder, using an annular grinding wheel to grind the tooth sides of the workpiece, is shown in Fig. 9. The workpiece is mounted on a fixed axis and is adjustable along this axis. The grinding wheel is mounted on a cradle, which has a fixed axis.

In Fig. 10 a tooth side $S$ is shown in view along the axis of the crown gear. Tangent $PM$ to the line of contact $I$ is inclined to the pitch line tangent $PM_t$ at an angle $w$ and at an angle $\psi_b$ to instantaneous axis $OP$. These angles appear reduced in the drawing. Spiral angle $\psi$ is the angle included between the instantaneous axis $OP$ and the pitch line tangent $PM_t$.

Fig. 11 is a section perpendicular to the pitch line tangent and a view along this tangent. The tangent plane at $P$ to side $S$ appears here as a straight line $MM_t$, whose normal is inclined to the pitch plane at the pressure angle $\phi$.

Angles $w$ and $\psi_b$ can be determined by projecting a point $M_t$ of the instantaneous axis to the tangent plane, to a point $M$. $M_t$, in Fig. 10, is the normal projection of point $M_t$ to the pitch line tangent. Fig. 10 shows:

$$\tan w = \frac{MM_t}{PM_t}\text{; for } MM_t \text{ see Fig. 11}$$

$MM_t = M_t M_t \cdot \sin\phi = PM_t \cdot \tan\psi \cdot \sin\phi$; hence,

$$\tan w = \tan\psi \cdot \sin\phi \quad (5)$$

The transverse plane is a plane perpendicular to the instantaneous axis $OP$. It intersects tooth side $S$ in the transverse profile, while the normal plane intersects it in the normal profile of this tooth side. To obtain the angle between the two profiles, that is between their tangents at point $P$, points $G$ and $G'$ of said tangents, Fig. 10, are considered. These points lie in the common tangent plane, at the same elevation from the pitch plane of the basic crown gear. Their connecting line is therefore parallel to the pitch line tangent.

If the actual distance in space $GP$ equals unity, or one, in the scale shown, then the projected distance $GP$ of Fig. 10 is equal to $\sin\phi$, and distance $GG'$ amounts to $\sin\phi \cdot \tan\psi$ where $\phi$ and $\psi$ denote the pressure angle and spiral angle at point $P$. The trigonometrical tangent of the included angle is seen to amount to $\frac{GG'}{1}$, that is $\tan\psi \cdot \sin\phi$.

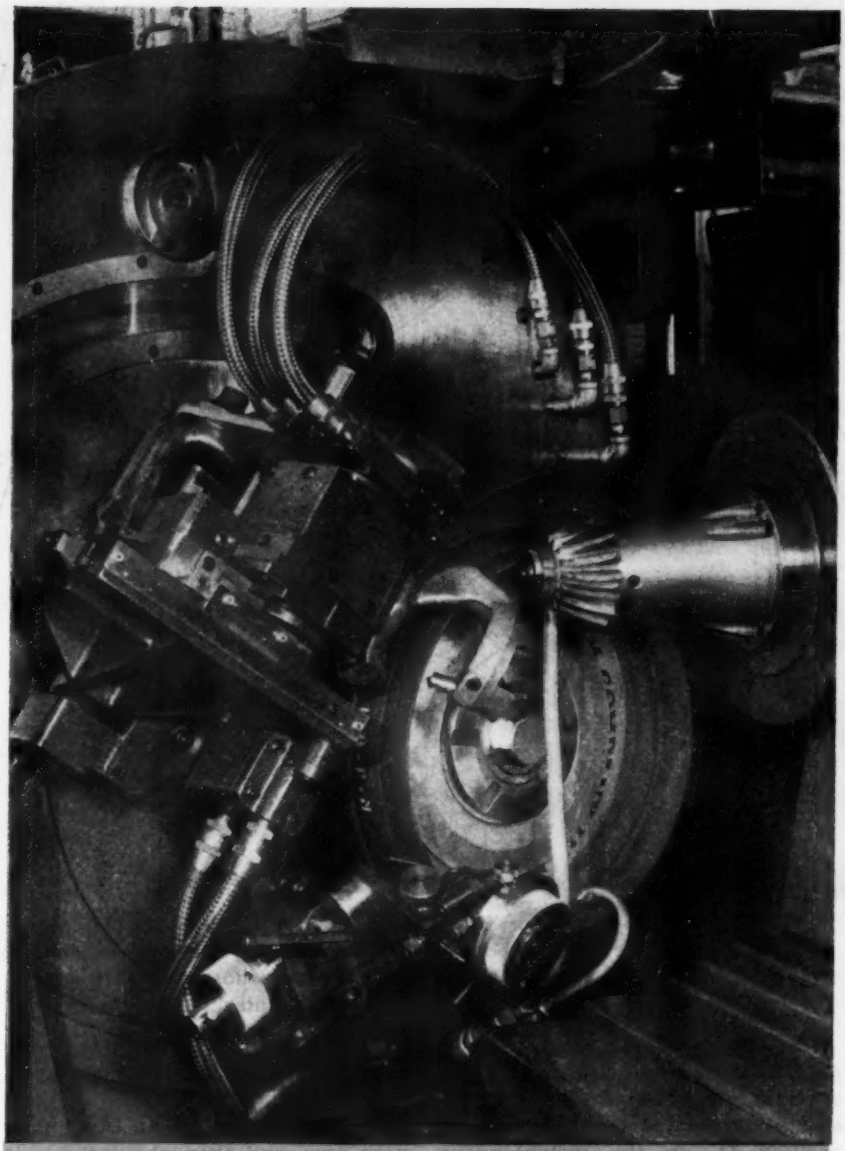


Fig. 9—The grinding wheel represents a conical tooth surface of a basic crown gear and generates gear teeth in a rolling motion, as if the crown gear would mesh with the gear

This is equal to $\tan w$, as expressed by formula (5), and the angle included between the two profiles is therefore equal to the angle $w$. Thus the instantaneous line of contact $I$ is perpendicular to the transverse profile at pitch point $P$.

Moreover

$$\sin\psi_b = \frac{MM_t}{PM_t}\text{; for } MM_t \text{ see Fig. 11}$$

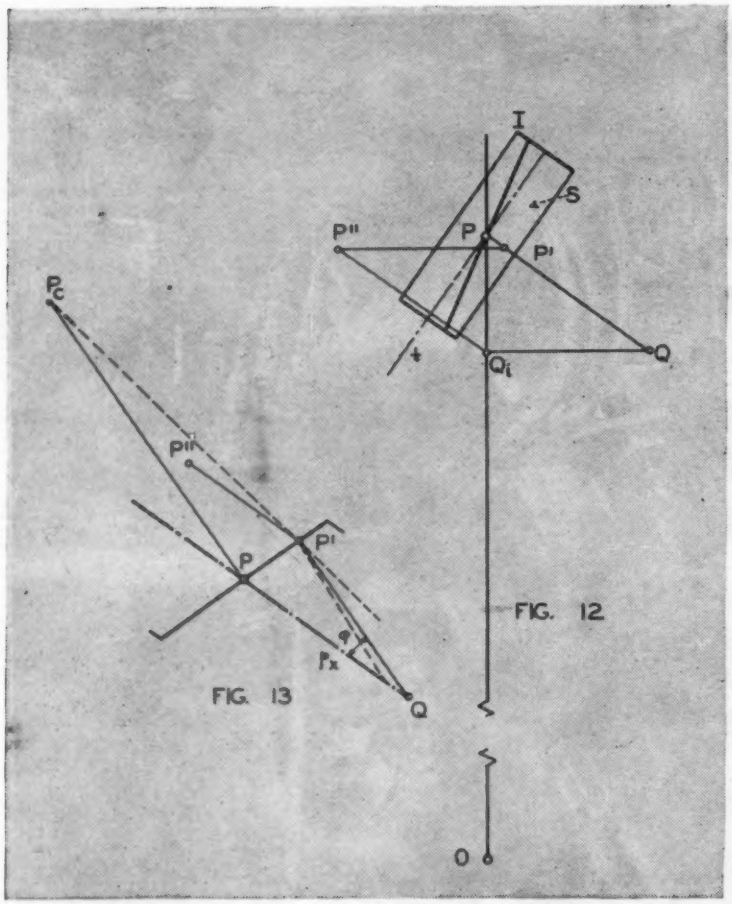
$$MM_t = M_t M_t \cdot \cos\phi$$
$$= PM_t \cdot \sin\psi \cdot \cos\phi$$
$$(6) = \sin\psi_b = \sin\psi \cdot \cos\phi$$

In investigating the curvature of the generated tooth surface a small surface portion around point $P$ is shown in Fig. 12, greatly magnified. In this infinitely small surface portion the tooth side $S$ coincides with its tangent plane at $P$.

Consider a point $P'$ of the normal section. Inasmuch as $PP'$ is a straight line element of the conical tooth side $S$, the surface normal at $P'$ to side $S$ is parallel to its normal at point $P$. It intersects the pitch plane $p_z$ of the crown gear at $Q$ (see also Fig. 13), which is a view along the pitch line tangent. Fig. 13 shows

$$PQ = \frac{PP'}{\sin\phi}$$

Point $P'$ of the crown gear tooth



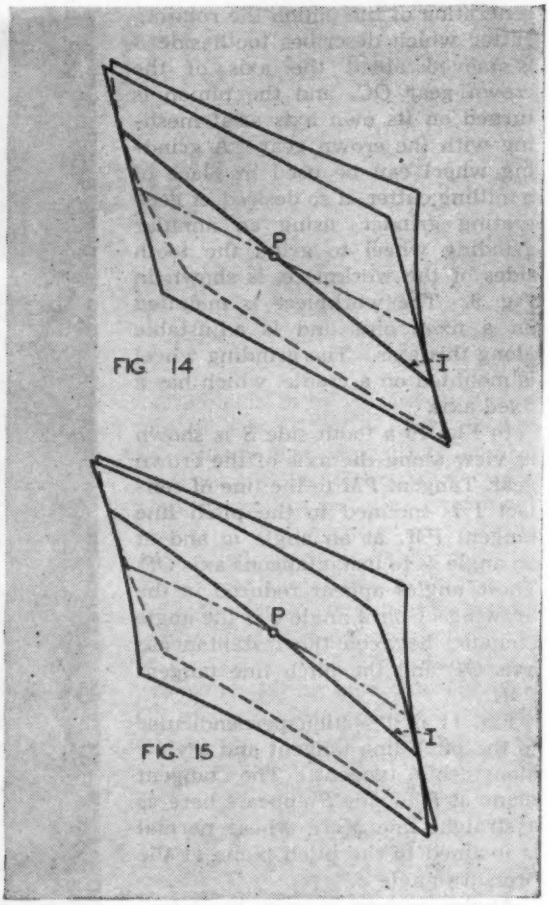




**Fig. 12 and 13—Tooth curvatures are computed by observing the inclination of the tooth normals as they are turned about the instantaneous axis. Fig. 14—In any elemental region a plane tooth side contacts with its mating tooth surface as with a cylindrical surface whose axis is inclined to the pitch line. Fig. 15—Curved mating tooth sides contact like a plane and a cylindrical surface, in any elemental region**

gets into contact with the pinion when turned about the crown gear axis until point $Q$ has moved to a position $Q_i$ on the instantaneous axis. Here the condition of contact is fulfilled, for the normal passes through the instantaneous axis.

The transverse displacement $QQ_i$ of point $Q$ is

$$QQ_i = PQ \cdot \cos \psi = \frac{PP'}{\sin \phi} \cdot \cos \psi$$

Point $P'$ is moved an equal distance $P'P''$ to position $P''$, at the infinitely small distances considered. It is in contact when at $P''$, and then belongs to the pinion as well as to the crown gear.

When the pinion is turned back about its axis, so that it contacts the crown gear in its initial position, point $P''$ of the pinion moves back to the position $P'$. Thus its final position differs from $P'$ only by an infinitesimal fraction of $PP'$. The difference in the limit case is therefore zero.

Together with point $P''$ its normal is also turned back, to a position $P'P_e$ shown in exaggerated form in Fig. 13. Normal $P'P_e$ is inclined to the original normal $P'Q$, for it has been turned first about the crown gear axis, and then about the axis of the pinion. With $A$ denoting distance $OP$, the turning angles about these two axes are

$$\frac{P'P''}{A} \text{ and } \frac{P'P''}{A \sin \gamma} \text{ in radian measure.}$$

The two infinitesimal turning motions add up to a resultant turning motion about the instantaneous axis $OP$, which can be determined by geometrical addition of the two individual turning motions. It is the relative turning motion between the pinion and the crown gear, and amounts to

$$\frac{P'P''}{A \sin \gamma} \cos \gamma = \frac{P'P''}{A \tan \gamma}$$

As with angular or turning velocities of bevel gears, any instantaneous or infinitesimal turning motions can be geometrically added to give a resultant turning motion. A given resultant can also be resolved into components. Thus the resultant turning motion of the normal about the instantaneous axis can be resolved into a component whose turning axis extends along the pitch line tangent $t$, and into a perpendicular component, both located in the pitch plane. The latter component has no effect on the inclination of the normal with respect to the pitch plane, given completely by the first component and which amounts to

$$d\phi_p = \frac{P'P''}{A \tan \gamma} \cos \psi = \frac{PP'}{A \tan \gamma \sin \phi} \cos^2 \psi$$

In a view along the pitch line tangent $t$, Fig. 13, only this change of inclination is seen, and the projected normal $P'P_e$ at $P'$ appears inclined at the above angle to normal $P'Q$ and to normal $PP_e$ at $P$.

In considering a normal section $PQ$, perpendicular to $t$ through the generated tooth surface of the pinion, Fig. 12, the normals of the sectional profile are identical with the projected surface normals, such as $P'P_e$ in Fig. 13. These normals

cross normal $PP_p$ at point $P_p$, at a distance $\rho_p = PP_p$ from $P$. This radius of curvature of the normal tooth profile $\rho_p$ is equal to distance $PP'$ divided by the above inclination of the normals at points $P$ and $P'$. The radius of curvature $\rho_g$ of the gear member may be similarly determined.

$$(7) \quad \rho_p = \frac{PP'}{d\,\phi_p} = \frac{A \tan \gamma \sin \phi}{\cos^2 \psi};$$

$$\rho_g = \frac{A \tan \Gamma \sin \phi}{\cos^2 \psi}$$

It can be shown that $\frac{A \tan \gamma}{\cos^2 \psi}$ is the radius of curvature of the pitch surface of the pinion in the considered normal section, and $\frac{A \tan \Gamma}{\cos^2 \psi}$ is the corresponding radius of curvature of the gear pitch surface. The sum of their reciprocals amounts to

$$\frac{\cos^2 \psi}{A} (\text{ctn } \gamma + \text{ctn } \Gamma)$$

and is the relative curvature of the pitch surfaces in the normal section.

The relative curvature $\frac{1}{\rho_r}$ of the normal tooth profiles themselves is

(8)

$$\frac{1}{\rho_r} = \frac{d\,\phi_p + d\,\phi_g}{PP'} = \left(\frac{1}{\rho_p} + \frac{1}{\rho_g}\right)$$

$$= \frac{\cos^2 \psi}{A \sin \phi} (\text{ctn } \gamma + \text{ctn } \Gamma)$$

When any other surface having the same pressure angle $\phi$ and spiral angle $\psi$ as the previously considered conical surface is substituted for side $S$ of the crown gear tooth, then the normal at point $P'$ has a direction differing only infinitesimally from the previous direction. In the limit case of infinitesimal distances $PP'$ it will therefore take the same turning angle of the crown gear to bring point $P'$ into contact with the pinion or gear being generated. It will also take the same turning angle to bring the pinion or gear back to starting position, whereby $P''$ moves back to $P'$. This results in the normal being turned about the instantaneous axis through the same angle. The profile normals of the pinion and gear, at point $P'$, are therefore inclined to each other at the same angle: the relative curvature of the normal profiles is independent both of their individual curvature and the curvature in any direction of the individual tooth surfaces. In a normal section, the relative curvature of the profiles of mating tooth sides, at a pitch point $P$, is equal to the relative curvature of the pitch surfaces divided by the sine of the pressure angle. This applies broadly to all tooth forms of gears whose axes are in the same plane.

It is even applicable to worm gear pairs whose axes are at right angles, when one of the two members contains helical threads or teeth. The pitch surface of the helical member is then to be introduced as a plane, which when moved axially instead of being turned on its axis, would be the pitch plane of the rack represented by the helical member.

If the tooth side of the gear member is a plane, the normal profile of this tooth side is straight and without curvature. The curvature of the mating normal profile is then equal to the relative curvature $\frac{1}{\rho_r}$. The teeth then contact each other as a plane contacts a cylindrical surface, whose contacting element is inclined at angle $w$ to the pitch line tangent at point $P$. The radius of this cylindrical surface, in a section perpendicular to its element of contact, is therefore

$$(9) \qquad \rho_r \cdot \cos^2 w$$

inasmuch as the aforesaid normal profile, whose curvature radius is $\rho_r$, is inclined at the angle $w$ to said section. This is illustrated in Fig. 14 in perspective.

All other forms of teeth having the same tangent plane at $P$, contact each other in like manner, for their normal profiles have the same relative curvature and their line of contact is inclined at the same angle $w$. Thus formula (9) applies to all forms of teeth.

This general case is illustrated in Fig. 15 and shows a gear tooth surface bent two ways, as compared with the plane tooth surface shown in Fig. 14. The air space bounded by the two contacting tooth surfaces is bent accordingly, but still has the same direction and the same curvature. This means that the load capacity of the tooth surface portions considered is the same as before and independent of the nature of the tooth surfaces, provided the tangent plane at pitch point $P$ is the same.

Relative curvature at a mean point is an indicator of the general relative curvature conditions of the tooth surfaces, and a characteristic of the tooth surface capacity. It is one of the limiting factors in obtaining large ratios with a single pair of gears. If an unduly large gear ratio is attempted with a single pair of gears, whose axes are in the same plane, the large relative curvature may reduce the surface capacity of the teeth up to the point where the drive is uneconomical. Moderate relative curvature is a chief guarantee against surface failure.

*A third installment on bevel gears, including a special analysis of gear mesh, will be published in an early number.*

### CORRECTION

In the first installment of this series on bevel gears, printing errors altered some of the formulas. In the derivation of Formula (3), at the expression for $d\,\theta_1$, a multiplication sign should have appeared at the end of the line so that it read into the next line.

Also, the line immediately above Formula (4) should have read

$$\frac{\omega'}{\sin \Gamma} = \frac{v}{A \sin \gamma \sin \Gamma} = \frac{\omega''}{\sin \gamma}$$

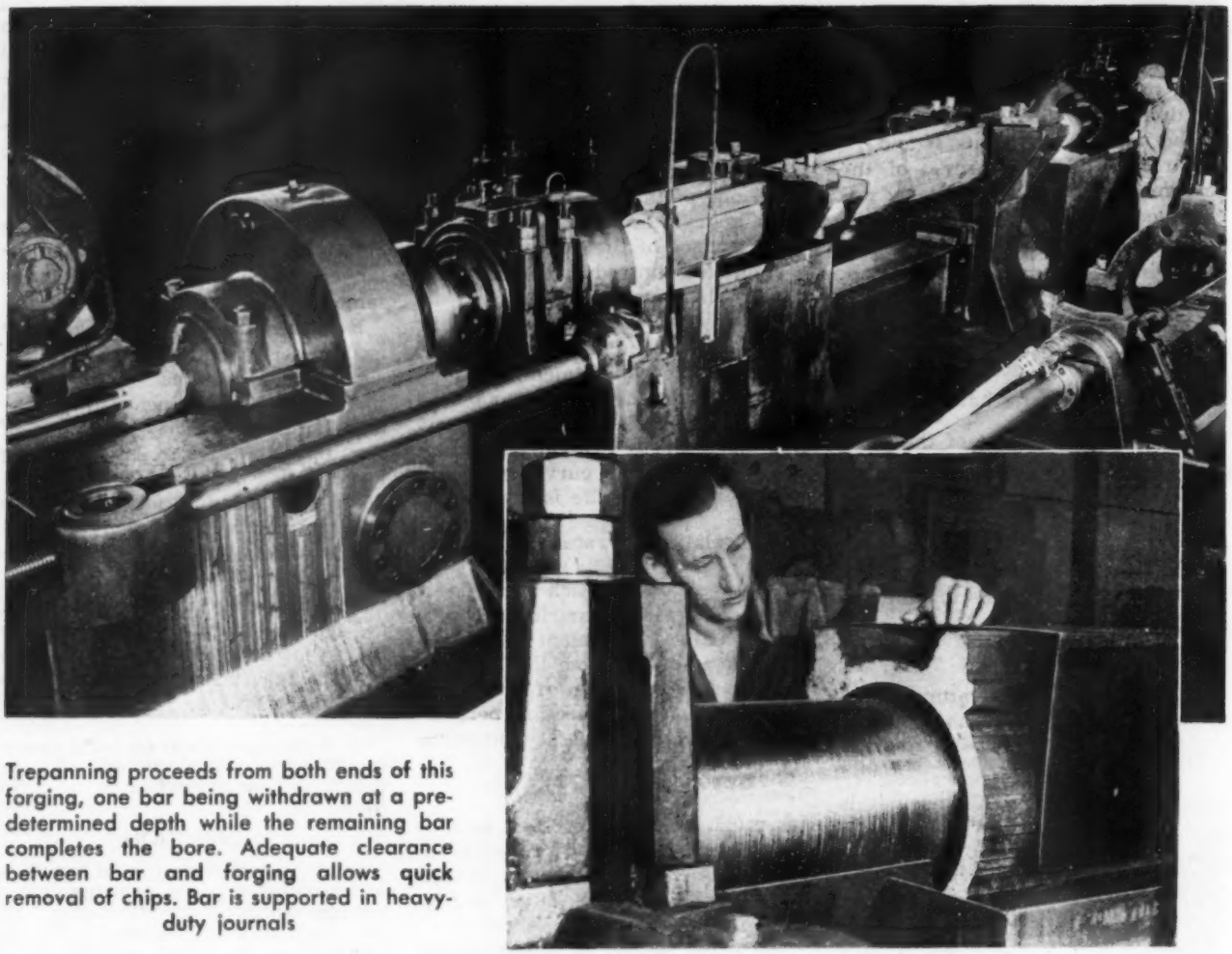
A parenthesis should have been added in Formula (4b), to read

$$(4b) \quad v_1 = v \cdot \epsilon \cdot \left(\frac{\cos \Gamma}{R''} + \frac{\cos \gamma}{R'}\right)$$

## "Exclusive Revelation" Versus Facts

DESPITE the excellent job that industrial concerns have done in winning the war, some columnists and commentators seem bent on finding nothing but selfish motives behind the activities of "big business". A recent example is an "exclusive revelation" by Walter Winchell in which he charged that the State Department is threatening to have legislation introduced in Congress to "give the atomic bomb secret to the Du Pont Company."

This statement was so contrary to the facts that W. S. Carpenter, Jr., president, E. I. du Pont de Nemours & Co., wired Secretary of State Byrnes to the effect that his company had from the first disclaimed any possible authority over this development. "We stipulated that no profit come to us except a fixed fee of $1", said Mr. Carpenter, that no patent rights whatsoever in connection with atomic energy projects should accrue to the company or any other employee; and it was written into the contract that all discovery of a novel or inventive character be at government disposal.



Trepanning proceeds from both ends of this forging, one bar being withdrawn at a predetermined depth while the remaining bar completes the bore. Adequate clearance between bar and forging allows quick removal of chips. Bar is supported in heavy-duty journals

# DEEP HOLE TREPANNING Used on Heavy-Duty Forgings

TREPANNING or hollow boring is usually confined to short distances such as the ends of locomotive connecting rods and similar types of work. At the Mesta Machine Company plant it is one of the major operations in production of the 155 mm. guns, and is used to bore the rings or hoops which carry the recoil slides. These hoops, forged with the slides projecting, are rough planed before boring. The forgings are made in lengths up to 16 ft.

After rough planing, the forgings go to the boring machines for removal of the core and trepanning proceeds from both ends of the forging. The boring bars, with the trepanning tools inserted in the end, are turned down behind the tools to provide room for the chips to be washed out as boring proceeds. The boring heads, at both ends of the forging, drive the bars and slide along the bed as the bars are fed into the work. Heavy-duty journal bearings support the bars.

At a given depth one of bars is withdrawn and the other comes in to complete the bore. The core is then brought out by this bar. The tools remove approximately 1 in. of metal on each side. Spindle speed is 20 r.p.m. and the rate of feed is 4 in. per hr. Feeding from both ends completes the bore in 24 hrs. A coolant pressure of 50 to 75 lb. is maintained and a flow of 275 gal. a minute removes the chips.

A watt meter, installed on the machine, sounds a warning by means of a contact on the hand when the power required exceeds the safe limit and operation is stopped before tools or work are damaged.

Although this heavy-duty trepanning may not have broad application, it possesses important advantages for specialized requirements. Danger of excessive runout on such deep holes is always present and demands that adequate bushing be applied and that journals be heavy-duty and of sufficient length.

# The Disposal of Surplus Tools

## I...THE PROBLEM

**Of vital concern to the nation's metal-working industries and to equipment builders, the disposal of government surplus tools will not be easy for RFC officials charged with this responsibility**

BY BENJAMIN W. CORRADO, NEWS EDITOR

DURING THE WAR just ended, the government, through the Defense Plant Corporation, the War Department, the Navy Department and the Maritime Commission, has purchased well over two billion dollars worth of machine tools. Numbering over 600,000 units, these tools will probably wind up as a 500,000 surplus over what the government can use postwar in its arsenals, ordnance shops, and naval installations. This means that the government must dispose of that excess in the best manner feasible via sale, lease, export or standby storage.

Representing an estimated original cost of more than two billions, the 500,000 surplus tools represent a potential recovery to the nation of about a billion dollars even at the low prices the government has set for them. This indicates the magnitude of the task entrusted to the Reconstruction Finance Corporation by the Surplus Property Board acting by authority of the Surplus Property Act of 1944. This is in accordance with the policy of the Surplus Property Board to assign responsibility for the actual disposal of various surpluses to those agencies most familiar with the particular items involved. Since the Reconstruction Finance Corporation with its subsidiaries was the major procurement agency for machine tools and other capital equipment for installation in government plants or for use or lease by war contractors, it has been entrusted with the disposal of capital goods, including machine tools, metals, plants, and varied industrial equipment.

Despite the enormity of government surpluses, often estimated at around $100,000,000,000 in value, it is believed that the small percentage of this total represented by machine tools and allied equipment may have more important repercussions upon the nation's economy than other types of surplus. The reason is that this equipment offers an unsurpassed opportunity to upgrade swiftly the nation's industrial facil-

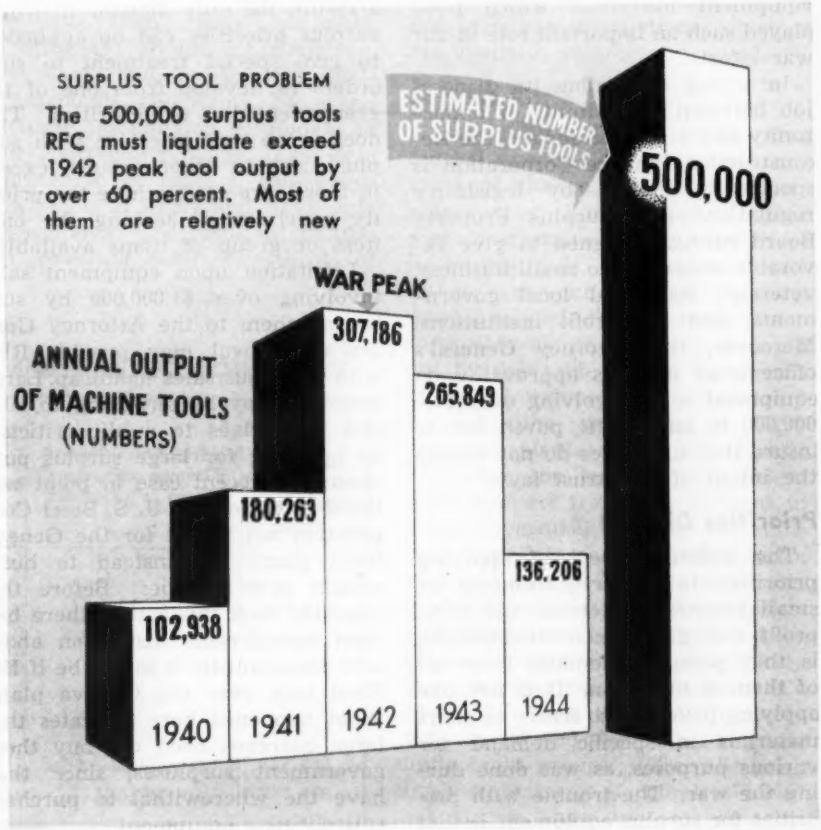


**TABLE I**

**PARTIAL LISTING OF GOVERNMENT-OWNED TOOLS**

| | 1. Tools in RFC-Owned Plants | 2. Tools in Army & Navy Ordnance Plants | 3. Total Tools in Government Plants | 4. Army-Navy-M.C. RFC Equip. in Contractor-Owned Plants | 5. Total Government Tools Listed | 6. National Total of Government & Privately Owned Tools | 7. % Column 5 is of Column 6 |
|---|---|---|---|---|---|---|---|
| Boring mills | 6,836 | 1,332 | 8,168 | 6,332 | 14,500 | 50,337 | 28.8 |
| Broaching machines | 709 | 189 | 898 | 883 | 1,781 | 9,701 | 18.4 |
| Drilling machines | 32,834 | 7,384 | 40,218 | 27,017 | 67,235 | 339,668 | 19.8 |
| Gear-cutting mach. | 7,697 | 495 | 8,192 | 4,490 | 12,682 | 55,034 | 22.9 |
| Grinding machines | 47,718 | 9,291 | 57,009 | 31,588 | 88,597 | 366,464 | 24.2 |
| Lathes | 32,415 | 12,364 | 44,779 | 44,473 | 89,252 | 418,501 | 21.3 |
| Milling machines | 19,068 | 6,834 | 25,902 | 28,698 | 54,600 | 171,763 | 31.8 |
| Planers | 597 | 373 | 970 | 1,021 | 1,991 | 16,427 | 12.1 |
| Shapers & slotters | 1,750 | 1,154 | 2,904 | 2,292 | 5,196 | 36,703 | 14.2 |
| Keyseaters | 115 | 32 | 147 | 107 | 254 | 4,466 | 5.7 |
| Honing & lapping | 2,936 | 691 | 3,627 | 1,844 | 5,471 | 16,134 | 33.9 |
| Polishing & buffing | 7,466 | 888 | 8,354 | 2,933 | 11,287 | 57,384 | 19.7 |
| Cut-off & sawing | 6,660 | 1,992 | 8,552 | 5,159 | 13,811 | 85,997 | 16.0 |
| Tapping & thread | 3,035 | 674 | 3,709 | 2,827 | 6,536 | 34,978 | 18.6 |
| Centering machines | 398 | 85 | 483 | 490 | 973 | 3,458 | 28.1 |
| Other machine tools | 3,893 | 992 | 4,885 | 9,368 | 14,253 | 44,122 | 32.4 |
| Total | 174,127 | 44,670 | 218,797 | 169,522 | 388,319 | 1,711,137 | 22.6 |

ities at low cost, yet, conversely, its improper disposal would ruin that opportunity and might seriously damage the machine tool and other equipment industries which have played such an important role in our war effort.

In trying to confine its disposal job between these limits of opportunity and economic danger, the Reconstruction Finance Corporation is specifically limited by legislative regulations and Surplus Property Board rulings designed to give favorable treatment to small business, veterans, state and local governments, and non-profit institutions. Moreover, the Attorney General's office must give its approval upon equipment sales involving over $1,000,000 to any single purchaser, to insure that such sales do not violate the intent of anti-trust laws.

### *Priorities Difficult*

The difficult aspect of applying priorities to the requirements of small business, veterans, and non-profit and government institutions, is that potential demand from all of them is unknown. It is not like applying priorities to scarce or short materials in specific demand for various purposes, as was done during the war. The trouble with priorities for surplus equipment is that there is more surplus in sight than potential priority demands, and such demands will take an extended period to be actually presented. As a result, the only manner in which surplus priorities can be applied is to give special treatment to such orders as develop from one of the groups entitled to priorities. This does in no way interfere with surplus sales to other groups, except in those rare cases where the priority purchaser is seeking the only item or group of items available.

Limitation upon equipment sales involving over $1,000,000 by subjecting them to the Attorney General's approval may provide RFC with a serious sales handicap. Large concerns may be unwilling to subject themselves to public criticism by applying for large surplus purchases. A recent case in point was the decision of the U. S. Steel Corporation not to bid for the Geneva Steel plant, but instead to build certain new facilities. Before this company took this action, there had been considerable discussion about how monopolistic it might be if Big Steel took over the Geneva plant. What happened here indicates that large concerns need not buy these government surpluses, since they have the wherewithal to purchase entirely new equipment.

Of course, large companies represent an important segment of the potential market for government surplus equipment. Few small firms will be able to buy entire plants worth millions. In a similar manner, the probable market among small industries for surplus tools and other equipment is limited in relation to the requirement of the mass-production industries.

However, the ability of small plants to buy or lease the equipment they need has been greatly enhanced under present regulations and special Surplus Property Board rulings.

### *Employment A Factor*

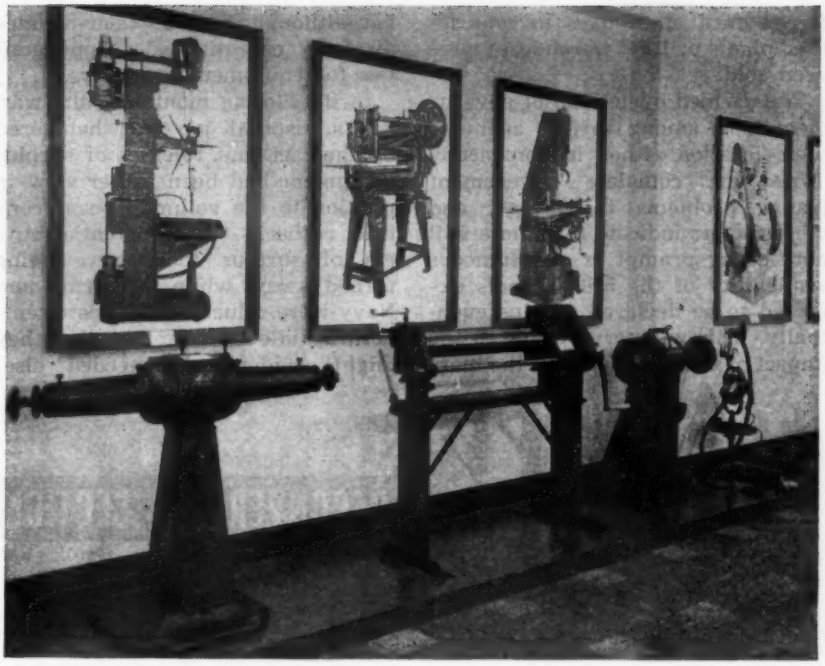
One important factor which the RFC must consider in its marketing policy is the general economic picture. Will prompt sale of certain surpluses aid or injure employment? The importance of employment at this time makes it one of the most potent factors at present in RFC's sales.

But the toughest question facing surplus disposal officials is just what slant in their sales policies will prove satisfactory to everyone. Policies designed to push sales might be criticized on the grounds that they did not help small business or some other group or groups, while

too much attention to small business or various pressure groups could lay officials open to criticism on the grounds of not selling enough surpluses or getting enough money for such sales. The huge size of the task, the various factors and different groups it touches upon, and the probability that it will be carried on over many years indicates that surplus disposal officials are likely to be subjected to severe criticism no matter what they do.

### Ten Years' Output

Keeping these various operating handicaps in mind, the RFC must dispose of the equivalent to a ten-year normal output of machine tools, ranging from brand new items to ancient machines. Some of these tools will find prompt markets. Others, especially those designed for military purposes will be more difficult to sell. Thousands of them will have to be crated and transported to central warehousing or disposal depots. And in certain categories, it will probably be necessary to hold some government tools off the domestic market to prevent serious damage to certain tool builders.



This section of the RFC warehouse disposal room in Chicago indicates the manner in which surplus equipment is displayed. The enlarged photographs lining the wall illustrate types of machine tools available from surplus stocks. Similar display rooms will be established in dozens of key industrial centers

As staggering as may be the numerical relationship of the 500,000 surplus tools to the prewar total of 940,000 operated by metal-working industries, conditions surrounding the sale of each type of tool will vary from the status of other types. Surpluses in some categories may be heavier than in others, new machine tools developed by builders may make obsolete some types of surplus tools, while the special design or make of certain types of surplus tools may impair their resale.

Unfortunately, there is no overall inventory of government-owned equipment by types of units available, although such information is now being compiled at the request of Congress. Part of this information has been made available, including RFC equipment in contractors' plants and in complete RFC-owned plants, and Army, Navy and Maritime Commission equipment in their contractor's plants. This data is presented in Table I, which also shows tools in Army and Navy ordnance plants. The resultant tabulation, covering about two-thirds of estimated government-owned tools, offers the largest detailed inventory of government equipment available thus far. The only information left out is data on other Army, Navy and Maritime installations, which is not available at present.

### Surplus Ratio

This partial listing shows that federal agencies own at least one-third of the nation's milling machines and honing and lapping machines; and about one-fourth of its boring mills, grinding machines, lathes, gear-cutting and finishing machines, and drilling machines.

Another significant point brought out by this table is that 56 percent of the government tools listed are located either in Army or Navy ordnance plants or in RFC plants. Moreover, the bulk of government tools omitted from this list are in other government plants and military installations. The significance of this dispersal is: (1) equipment in Army and Navy ordnance plants and other installations will not be offered for sale; and (2) it is ulikely that the equipment in most RFC-owned or other government plants will be offered for sale as single units or in groups, thereby impairing the salability of completely laid out plants. Thus, the sale of tools in such plants will probably be de-

**TABLE II**

**PARTIAL SUMMARY OF GOVERNMENT-OWNED EQUIPMENT**

| | Total RFC-owned | Army-Navy-Maritime Commission owned in contractor's plants | Total Government Equipment Listed |
|---|---|---|---|
| General-purpose industrial machinery and equipment | 151,051 | 7,291 | 158,342 |
| Electrical machinery and apparatus | 65,900 | 1,462 | 67,362 |
| Special industrial machinery | 14,540 | 2,290 | 16,830 |
| Machine tools | 247,729 | 95,920 | 343,649 |
| Other metal-working equipment | 89,953 | 32,334 | 122,287 |
| TOTAL | 569,173 | 139,297 | 708,470 |

*Source: Reconstruction Finance Corporation.*

ferred until other tools in contractors' plants or RFC warehouses have been sold.

The divided ownership of government tools among various agencies, their location either in contractor-owned or complete government plants, problems in storage, and other factors indicate that there will not be any prompt or simultaneous availability of the 500,000 tools expected to be declared surplus eventually. This will serve to lessen the impact of this surplus upon the market, although its sale sooner or later displaces potential sales opportunities for equipment producers.

In the closing months of the war, RFC's disposal job was hampered by the fact that releases of surplus equipment had been rather slow in relation to the volume of war contract cutbacks. Thus, potential buyers of surplus tools were being turned away, while the Army and Navy were reluctant to release temporarily idle tools for fear that they might suddenly be needed elsewhere. With the war over, releases probably have been intensified, although some delays may develop since the services know that RFC will have plenty of surplus units on its hands for marketing for some time to come. This possibility may further extend the liquidation period for surplus equipment.

Considering these various factors, it is obvious that the problem of surplus tool disposal is complicated from so many angles that its easy solution is impossible.

RECONVERSION SECTION

## THE DISPOSAL OF SURPLUS TOOLS

# 2... Moving Toward the Solution

ALTHOUGH 500,000 government-owned machine tools are eventually expected to be declared surplus, the number made available prior to the end of the war was very small. Up through May 31, 1945, the Reconstruction Finance Corporation has sold 10,508 surplus machine tools, leased 37, and had left on hand 17,353.

Standard tools have been sold almost as fast as they have been declared surplus. The slower moving items have been the special tools that were included in the recent small surplus total.

### *Prospects Posted*

Persons interested in buying surplus equipment should advise their nearest RFC Disposing Agency (See List) of their interest and designate the specific types in which they are interested. The local agency office will list the prospective buyer's name under corresponding files, and as such surplus items become available for sale, notifications are sent to those interested.

While local interested parties are always notified of any sales in particular area, prospective buyers in surrounding areas are also notified of important sales involving large numbers of items or of equipment of large value. Such listings of available equipment for sale will be circulated at least 10 days in advance.

The widest possible publicity is given to surplus sales. All logical advertising media are used, including daily newspapers and business papers. Announcement of sale is made in advance of the sale date to give potential buyers enough notice, so that they may arrange to inspect the surpluses involved.

RFC has been somewhat handicapped on advance notices in some cases where surpluses have had to be sold, arising from contract terminations. In such instances, it is most advisable for the government to make speedy sales to save the expanse of packing and transporting the items involved to some disposal center. Sales right at the contractor's plant is convenient, aids plant clearance, and reduces transportation and storage problems.

Eventually, all sales will be scheduled on a logical pattern basis. As surpluses become available, listings will be sent out to interested purchasers at a certain date in advance of the sale, inspection of the items to be sold will be scheduled for another adequate period before time of sale, and the sale will be advertised well in advance. Blanket coverage of all potential purchasers will be attempted.

Sale of machine tools is made on the basis of the Clayton price formula (See Table II). Prices to contractors in possession are slightly higher than to other purchasers. The reason is that the contractor in possession has the tool, it is already installed in his plant, and he does not have to worry about transportation and handling. By the same token, such sales are advantageous to the government since they relieve it of the responsibility of taking the tool up from its foundation, packing it, transporting it, and storing it, all of which costs hundreds of dollars per tool.

### *Sales F.O.B.*

Sales made to other than contractors in possession are made f.o.b. cars or trucks at the location of the tool at the time of sale. The Clayton formula is applied against the original price of the machine tool, including electrical equipment and standard accessories. When special tooling is sold with the machine tool, its original price is included less deductions based on the Clayton formula. Thus, a tool 36 or more months old would be sold to a contractor in possession at 50.2 percent of its original cost, and to others at 45.2 percent of original cost.

Since the Clayton formula only

## TABLE III
## Number of Army-Navy-Maritime Commission-Owned Machine Tools in Contractor's Plants and Total RFC-Owned

| | |
|---|---|
| **Boring Machines** | |
| Horizontal, boring, drilling and milling machines | 2,887 |
| Vertical boring and turning mills (including vertical turret lathes) | 4,022 |
| Precision boring machines | 4,638 |
| Jig boring and grinding machines | 945 |
| Miscellaneous boring machines | 676 |
| | 13,168 |
| **Broaching Machines** | |
| Internal broaching machines | 988 |
| Surface broaching machines | 355 |
| Combination external and internal broaching machines | 120 |
| Broaching machines not elsewhere classified | 129 |
| | 1,592 |
| **Drilling Machines** | |
| Deep hole drilling machines—all sizes (including rifle drilling machines and rifle drilling and reaming machines) | 1,579 |
| Radial drilling machines, plain | 8,110 |
| Radial drilling machines, wall type | 132 |
| Radial drilling machines, except plain and wall type | 1,433 |
| Drilling machines sensitive and power fed, upright, except bench type, one and more columns with spindles independently fed | 31,053 |
| Drilling machines, bench type | 7,925 |
| Drilling machines, way and special | 5 553 |
| Drilling machines not elsewhere classified | 4,066 |
| | 59,851 |
| **Gear Cutting Machines** | |
| Gear hobbing machines | 3,126 |
| Gear shapers, spur, helical and herringbone | 3,411 |
| Gear cutters and generators | 1,596 |
| Gear tooth grinding machines | 2,433 |
| Gear finishing machines, except grinders | 1,621 |
| | 12,187 |
| **Grinding Machines** | |
| External cylindrical grinding machines, except centerless | 12,497 |
| External cylindrical, centerless | 2,575 |
| Internal cylindrical grinding machines | 10,209 |
| Surface grinding machines | 12,719 |
| Thread grinding machines | 2,923 |
| Special tool and cutter grinding machines | 11,177 |
| Universal tool and cutter grinders | 5,832 |
| Disk face and stand grinders | 14,210 |
| Grinding machines, miscellaneous (do not include abrasive cut-off machines) | 7,164 |
| | 79,306 |

| | |
|---|---|
| **Lathes** | |
| Lathes, engine and tool room | 21,329 |
| Bench type and light duty less than 1 hp lathes (include bench turret lathes and bench hand screw machines) | 8,053 |
| Turret lathes, ram type (include hand screw machines except bench type) | 12,840 |
| Turret lathes, saddle type | 8,489 |
| Automatic chucking and between centers lathes | 7,458 |
| Automatic screw machines, single spindle bar | 4,036 |
| Automatic screw machines, multi-spindle bar | 6,171 |
| Artillery ammunition and boring lathes | 3,927 |
| Lathes not elsewhere classified | 4,295 |
| | 76,888 |
| **Milling Machines** | |
| Milling machines, bed type | 12,057 |
| Milling machines, knee-type, horizontal | 11,725 |
| Milling machines, knee-type, vertical | 6,331 |
| Milling machines, universal head and ram type | 1,712 |
| Milling machines, thread hobbers | 2,746 |
| Milling machines, bench and hand | 3,429 |
| Profilers and contour die sinkers, duplicators, cam and engraving millers | 5,266 |
| Milling machines, planer type | 359 |
| Miscellaneous milling machines | 4,131 |
| | 47,766 |
| **Planers** | |
| Planers, double housing (include convertible) | 720 |
| Planers, open side | 326 |
| Crank planers and shaper planers | 257 |
| Plate planers | 80 |
| Planers, miscellaneous | 235 |
| | 1,618 |
| Shapers and slotters, except gear shapers | 4,042 |
| Keyseating machines | 222 |
| Honing and lapping machines, except gear honing and lapping | 4,780 |
| Polishing and buffing machines | 10,399 |
| Cut-off and sawing, contour sawing and filing machines | 11,819 |
| Tapping and threading machines | 5,862 |
| Centering machines | 888 |
| Machine tools not elsewhere classified | 13,261 |
| GRAND TOTAL | 343,649 |

accounts for tools up to three years old, the Surplus Property Board has issued regulations for the pricing of older tools. Thus, a tool manufactured before March 1, 1941, but after January 1, 1936, may be sold at the March 1, 1941, price of an equivalent tool, less the Clayton formula discounts, instead of such deductions being made from the actual original cost of the tool. Tools manufactured prior to January 1, 1936, are to be sold at current market prices, but not higher than Clayton formula prices.

In view of this, older tools and other equipment are examined by government appraisers and values assigned to them. Such items are then sold on a fixed price basis. Tools and equipment that are old and obsolete are offered for sale on a sealed bid basis.

Sales are made on generous terms, entirely aside from the large discounts allowed under the Clayton formula. Purchasers have the usual commercial right on transactions involving $100,000 or less to pay within a 60-day period after sale without paying any interest on the amount involved.

RFC will make direct loans to potential purchasers to help them buy surplus equipment, at interest of 4 percent on the unpaid balance. In line with its usual practice, RFC would prefer to have its customers approach their local banks for a loan first. In such cases, RFC is willing to guarantee 75 percent of such loans with a ceiling up to $250,000 for a single loan. Sales of machine tools may also be made on a deferred payment plan with a minimum down payment of 15 percent of the sale price and maximum credit of five years with interest

## TABLE IV—Selected Army-Navy-Maritime Commission Owned Equipment Items in Contractors' Plants and RFC-Owned Items in Contractors' and Government Plants

| DESCRIPTION | QUANTITY |
|---|---|
| **Miscellaneous** | |
| Overhead traveling cranes, except gantry and monorail | 8,520 |
| Gantry-type cranes and ore bridges—all types | 515 |
| Whirley cranes (include revolving and rotary cranes)—all types | 789 |
| Powered trucks, industrial—all types | 7,546 |
| Hand trucks—all type | 64,150 |
| Tractors, industrial—all types | 2,103 |
| Trailers for industrial tractors—all types | 21,074 |
| Stackers (portable platform-type elevators)—all types | 1,323 |
| Motors, fractional horsepower, alternating current | 18,394 |
| Motors, fractional horsepower, direct current | 1,027 |
| Motors, fractional horsepower, universal | 699 |
| Motors, integral horsepower, alternating current | 34,600 |
| Motors, integral horsepower, direct current | 6,781 |
| Surfacing machines, woodworking—all types | 1,408 |
| Lathes, woodworking, except veneer lathes—all types | 280 |
| Jointers, matchers and molders—all types | 562 |
| Mortisers and tenoners—all types | 79 |
| Foundry, core making machines | 914 |
| Foundry molding machines | 3,344 |
| Foundry shakeout equipment | 623 |
| Foundry tumbling barrels and mills | 1,083 |
| Foundry blast cleaning equipment (for castings), except barrels and mills | 1,762 |
| Foundry die casting machines | 106 |
| Foundry centrifugal casting machines | 171 |
| **Primary Metal-Forming Machines and Equipment Not Elsewhere Classified** | |
| Bending machines, plate and sheet roll bending | 521 |
| Bending machines, plate and sheet roll levelers (straightening) | 183 |
| Bending machines, plate and sheet forming rolls | 1,100 |
| Bending machines, plate and sheet-press and apron brakes | 1,458 |
| Shape, bar, pipe, and tube bending machines (roll type and bending head type) | 1,011 |
| Bending machines, pipe and tube flanging and expanding rolls | 338 |
| Bending machines—press type | 208 |
| **Hydraulic Presses** | |
| Vertical—forming or drawing | 1,508 |
| Vertical—general utility | 1,918 |
| Vertical—forging (self-contained) | 263 |
| Vertical—forging, steam pneumatic | 272 |
| Horizontal—wheel, force, arbor | 734 |
| Horizontal—piercing, drawing | 221 |
| **Mechanical Presses** | |
| 1 point vertical | 3,369 |
| 2 point vertical | 734 |
| 4 point vertical | 45 |
| End wheel vertical | 431 |
| Horizontal | 420 |
| Inclinable | 2,239 |
| **Shearing and Punching Machines** | |
| Alligator shears | 391 |
| Rotary disk shears (circle) | 152 |
| Rotary slitting shears | 417 |
| Square shears | 1,586 |
| Combination punching and shearing machines (include single operation punching or shearing machines) | 1,002 |
| Double housing multiple punch | 134 |
| Turret punches | 227 |
| Nibbling machines | 352 |
| **Forging Machinery** | |
| Hammers | 4,108 |
| Headers and forging machines (upsetters) | 317 |
| Roll | 356 |
| Swagers | 482 |
| Miscellaneous forging machinery | 129 |

| DESCRIPTION | QUANTITY |
|---|---|
| **Wire Forming Machines** | |
| Die forming press for paper clips, safety pins, and similar products | 37 |
| Stranding, twisting and braiding machines | 3,863 |
| Winding machines for coiling springs | 129 |
| Wire straightening machines (include wire straightening and cutting machines) | 322 |
| **Miscellaneous Secondary Metal-Forming and Cutting Machines Equipment** | |
| Thread rolling machines | 196 |
| Tube reducing machines | 70 |
| Shrinking machines (sheet metal) | 298 |
| Marking machines | 2,757 |
| **Welding Machinery and Equipment Electric-Welding Equipment** | |
| Arc-welding equipment | 25,784 |
| Resistance-welding equipment | 4,035 |
| **Gas Welding, etc.** | |
| (Oxyacetylene, Oxyhydrogen and Related Fuel Gases) | |
| Acetylene generators | 310 |
| Flame cutting machines | 1,052 |
| **Welding Equipment** | |
| Thermit type | 33 |
| **Testing and Measuring Machines, Physical Properties Testing Machines** | |
| Hardness testing machines | 5,045 |
| Pressure testing machines (hydraulic) | 629 |
| Spring testing and checking machines | 286 |
| Strength of material testing machines | 1,032 |
| Miscellaneous physical properties testing machines | 1,939 |
| **Machines for Testing Structure and Composition of Metals** | |
| Fluorescent penetrating inspection machines | 264 |
| Magnetic inspection machines | 1,743 |
| X-ray machines | 399 |
| **Balancing Machines** | |
| Static | 301 |
| Dynamic | 314 |
| Combination static and dynamic | 265 |
| **Inspection Testing and Measuring Machines** | |
| Comparators | 5,583 |
| Gear measuring and testing machines | 1,642 |
| Hob, worm and cutter measuring machines | 155 |
| **Miscellaneous Testing and Measuring Machines Not Elsewhere Classified.** | |
| Graduating machines (dividing) | 4,629 |
| **Heat-Treating Furnaces and Devices** | |
| (Include Hardening, Annealing, Tempering, Normalizing, Cyaniding, Carburizing Operations) | |
| Electric | 5,580 |
| **Electroplating and Anodizing Equipment** | |
| Electroplating machines | 1,495 |
| **Riveting Machines** | |
| Helve hammer-type | 3,699 |
| Rotary vibrating-type | 397 |
| Spinning-type | 165 |
| Squeeze-type | 10,252 |
| **Metal-Heating Furnaces and Devices** | |
| Induction-heating devices | 645 |
| **Metal-Spraying Equipment** | 1,594 |

Stored in an emergency corrugated steel warehouse, these swaging and rifling machines are only part of the 500,000 tools expected to be eventually declared surplus. The rifling machines would have to be overhauled for peacetime use

at four percent annually. Where state laws prohibit term sales, a chattel mortgage, or some other credit instrument is employed.

When a person is not willing or able to purchase surplus equipment for cash, or on terms, he may lease such items. Tools may be rented at the standard commercial rate of 1½ percent a month, based on the original cost of the tool to the government.

To spread its sales activities for the benefit of potential purchasers, RFC has designated all of its regional agencies as Disposing Agencies. These 31 outlets are strategically located throughout the country, and are interconnected by teletype to enable an easy exchange of surplus information for the sake of buyers.

RFC has already opened 10 of 50 branch sales offices. These branch offices will have surplus display rooms, and interested parties can obtain information at any of them about RFC items.

In addition to these various outlets for buyers, RFC is arranging for surplus storage and disposal centers, most of which will be equipped with special display or salesrooms. These centers will be strategically located close to centers where surpluses will originate, and at the same time, be accessible to the largest number of potential purchasers in such areas. Many of them will naturally be at or near the Disposing Agencies or branch sales offices.

RFC will use storage space controlled by the Office of Defense Plants (RFC), government-owned war plants no longer needed for production purposes, new temporary construction, and Army Service Forces Depot space no longer needed by the War Department. Careful studies have been made of the type of storage space required for different surplus items. Accordingly, as required, items may be stored in heated or unheated warehouses, which will have loading platforms or handling equipment as required; while other items may be stored in pre-fabricated shelters erected on concrete foundations.

### *Disposal Sites*

RFC has 83 disposal center sites to select from, and has already put into operation 49 centers. Until the end of the war with Japan, its storage plans were well ahead of surplus declarations. However, the sudden, swift ending of the war has undoubtedly complicated storage and dispersal schedules for RFC.

There have been fears that improper crating and storage of tools and other equipment might result in considerable damage of these surplus items. However, RFC is making a serious effort to adhere to the best possible commercial practices in such storage preparation plans. Uniform instructions have been prepared in elaborate form with detailed drawings and descriptions to indicate the proper packaging, shipment and storage of different types of equipment. These instructions have been given wide circulation among those charged with handling the movement and storage of government surpluses.

On October 1, 1944, an original report on special methods for preparing major types of plant equipment and termination materials for shipping and storage was made for the Space Control Committee of the Surplus War Property Administration (now the Surplus Property Board) by the War Department, Army Service Forces, Storage Division, in cooperation with the other major procurement agencies. These instructions are being revised continuously.

In addition, DPC has maintained training schools at certain of its projects in order to give its field engineers practical instructions on the preparation of equipment for storage. About 1,000 DPC field engineers, representatives of the War and Navy Departments, lessees of DPC projects and contractors, have attended these schools.

Bearing in mind the numerous limitations of the Surplus Property Act, the RFC is going about its job of liquidating surplus equipment along the lines of the best commercial practices. Besides enlisting the aid of advertising experts, it will conduct various marketing surveys to help determine future liquidation policies. The RFC will try to dispose of as many of its surplus tools as possible within the United States, rather than abroad. Foreign sales will be sought only when American industry has been given a full opportunity to select its needs from these surpluses.

## TABLE V—RECONSTRUCTION FINANCE CORPORATION SALES OUTLETS

**RFC Disposing Agencies**

ATLANTA REGION: Healey Bldg., Atlanta 3, Ga.
BIRMINGHAM REGION: Comer Bldg., Birmingham 3, Ala.
BOSTON REGION: 10 Post Office Square, Boston 9, Mass.
CHARLOTTE REGION: Wilson Bldg., 109 West 3rd St., Charlotte 1, N. C.
CHICAGO REGION: 208 S. LaSalle St., Chicago 4, Ill.
CLEVELAND REGION: Federal Reserve Bank Bldg., Cleveland 1, Ohio
DALLAS REGION: Cotton Exchange Bldg., Dallas 1, Tex.
DENVER REGION: Boston Bldg., Denver 2, Colo.
DETROIT REGION: 607 Shelby St., Detroit 26, Mich.
HELENA REGION: Power Block, Helena, Mont.
HOUSTON REGION: Rusk Bldg., 723 Main St., Houston 2, Tex.
JACKSONVILLE REGION: Western Bldg., Jacksonville 2, Fla.
KANSAS CITY REGION: Federal Reserve Bank Bldg., Kansas City 6, Mo.
LITTLE ROCK REGION: Pyramid Bldg., Little Rock, Ark.
LOS ANGELES REGION: Pacific Mutual Bldg., Los Angeles 14, Calif.
LOUISVILLE REGION: Lincoln Bank Bldg., 421 W. Market St., Louisville 2, Ky.
MINNEAPOLIS REGION: McKnight Bldg., Minneapolis 1, Minn.
NASHVILLE REGION: Nashville Trust Co. Bldg., Union St., Nashville 3, Tenn.
NEW ORLEANS REGION: Richards Bldg., 837 Gravier St., New Orleans 12, La.
NEW YORK REGION: 70 Pine St., New York 5, N. Y.
OKLAHOMA CITY REGION: Cotton Exchange Bldg., Oklahoma City 2, Okla.
OMAHA REGION: Woodmen of the World Bldg., Omaha 2, Neb.
PHILADELPHIA REGION: 1528 Walnut St., Philadelphia 2, Pa.
PORTLAND REGION: Pittock Block, Portland 5, Oregon.
RICHMOND REGION: Richmond Trust Bldg., 7th and Main Sts., Richmond 19, Va.
ST. LOUIS REGION: Victoria Bldg., 407 No. 8th St., St. Louis 2, Mo.
SALT LAKE CITY REGION: Dooly Bldg., Salt Lake City 1, Utah
SAN ANTONIO REGION: Alamo National Bldg., San Antonio 5, Tex.
SAN FRANCISCO REGION: 200 Bush St., San Francisco 4, Calif.
SEATTLE REGION: Dexter Horton Bldg., Seattle 1, Wash.
SPOKANE REGION: Columbia Bldg., Spokane 8, Wash.

**Branch Sales Offices:**

Kahl Bldg., Room 503, Davenport, Iowa
Victory Bldg., 212 Ninth St., Pittsburgh, Pa.
Big Four Bldg., 230 Ninth St., Cincinnati, Ohio
500 Elk Street, Buffalo, New York.
Maryland Trust Co. Bldg., Baltimore, Md.
Portland Bldg., Room 407, Washington, D. C.
Hunt Bldg., Tulsa, Okla.
Shrine Bldg., Memphis, Tenn.
Room 1315, Hamilton National Bank Bldg., Chattanooga, Tenn.
El Paso National Bank Bldg., El Paso, Tex.

## SURPLUS TOOL PRICES BASED UPON CLAYTON FORMULA

| PERIOD OF ACTIVE USE | BUYER NOT IN POSSESSION | CONTRACTOR IN POSSESSION |
|---|---|---|
| Months | Percentage of original cost or base price | |
| Less than 1 | 85.0 | 90.0 |
| 1 | 82.5 | 87.5 |
| 2 | 80.0 | 85.0 |
| 3 | 77.5 | 82.5 |
| 4 | 75.0 | 80.0 |
| 5 | 72.5 | 77.5 |
| 6 | 70.0 | 75.0 |
| 7 | 69.0 | 74.0 |
| 8 | 68.0 | 73.0 |
| 9 | 67.0 | 72.0 |
| 10 | 66.0 | 71.0 |
| 11 | 65.2 | 70.2 |
| 12 | 64.4 | 69.4 |
| 13 | 63.6 | 68.6 |
| 14 | 62.8 | 67.8 |
| 15 | 62.0 | 67.0 |
| 16 | 61.2 | 66.2 |
| 17 | 60.4 | 65.4 |
| 18 | 59.6 | 64.6 |
| 19 | 58.8 | 63.8 |
| 20 | 58.0 | 63.0 |
| 21 | 57.2 | 62.2 |
| 22 | 56.4 | 61.4 |
| 23 | 55.6 | 60.6 |
| 24 | 54.8 | 59.8 |
| 25 | 54.0 | 59.0 |
| 26 | 53.2 | 58.2 |
| 27 | 52.4 | 57.4 |
| 28 | 51.6 | 56.6 |
| 29 | 50.8 | 55.8 |
| 30 | 50.0 | 55.0 |
| 31 | 49.2 | 54.2 |
| 32 | 48.4 | 53.4 |
| 33 | 47.6 | 52.6 |
| 34 | 46.8 | 51.8 |
| 35 | 46.0 | 51.0 |
| 36 or more | 45.2 | 50.2 |

Sales of tools to contractors-in-possession have been permitted under a recent Surplus Property Board ruling, but it is not expected that more than 25 percent of government-owned tools will be so sold. Most of the contractors in possession willing to buy such items are smaller plants. This step will aid reconversion, and reduce plant clearance problems, besides proving most economical to the government in savings on handling, packing, and transporting costs.

The Attorney General must pass on sales of tools costing over $1,000,000 to determine whether such sales would violate anti-trust laws.

The RFC's policies are intended to be flexible and are expected to be adjusted from time to time in the light of changing conditions. For example, with sales being made with considerable ease at present, the agency does not believe that it would be justified to enlist the aid of established used tool dealers. However, it envisages that later on when sales become more difficult, used tool dealers could have an important role in surplus tool distribution.

At the same time, RFC plans to enlist the aid of machine tool builders in its liquidation job. It is likely that tool builders may be asked to recondition some of the government tools prior to sale.

It is believed that non-industrialized nations would have a practical need for some good reconditioned equipment on which operators could be trained for work of a non-exacting nature.

Just as cutting tools are being channeled through the original manufacturers in a fixed ratio to the number of new items sold, RFC plans to resort to this device in cases where certain equipment items are available in excessive numbers.

As surpluses pile up, and various sales techniques or obstacles develop, it is likely that surplus regulations will be changed to meet new conditions and circumstances. Meanwhile potential purchasers of government surpluses will do well to keep informed of the mechanics of making purchases, and new regulations affecting them.

# Practical Ideas

**HAVE YOU A PRACTICAL IDEA?... If so, send it in. Your idea will help other men, in other shops, who have a problem similar to yours. We pay for acceptable contributions prepared exclusively for this publication**

## Machine Vise for Bandsaw Cutting Thin-Walled Alloy-Steel Tubes

BY JOSEPH R. E. PAQUIN

A critical shortage of power hacksaw blades developed in the shop. An investigation revealed that blade life was greatly shortened by using the power saw to cut chrome-molybdenum and other thin-walled tubing. It was noted that at least three teeth of the hacksaw should bear on the metal being cut. With such thin-walled tubing and coarse teeth in the hacksaw, this condition could not be obtained; in addition, the cutting speed was too high.

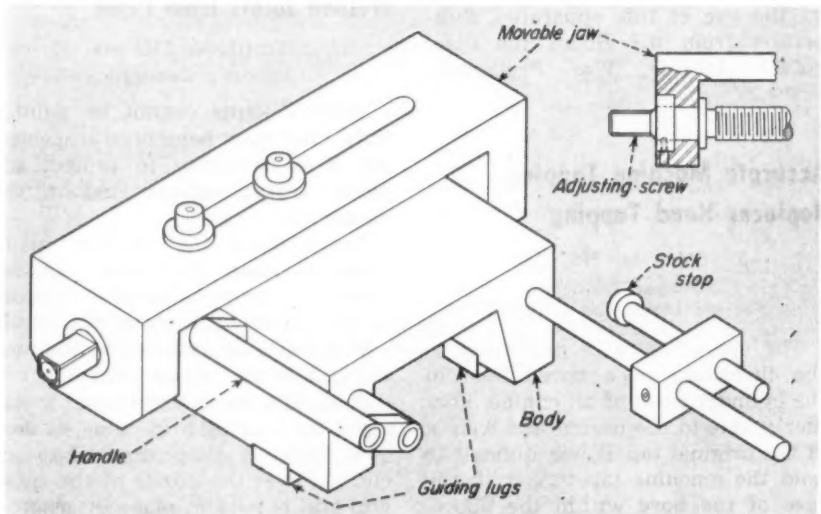
The decision was to transfer all tube cutting to the bandsaw where a saw of fine enough tooth pitch and proper cutting speed could be obtained.

A sliding vise, to grip the tubing while it was being fed into the saw, proved to be a success. The body of the vise was made from bar steel relieved at the bottom to reduce weight. It also had lugs which were made a snug fit in the bandsaw-table slots, assuring a square cut of the tubing. A handle on the body provides a comfortable grip for pushing the vise to the saw. The movable jaw is tightened against the tube by a screw with its head squared to fit a vise handle. A stop at the working end of the vise can be adjusted to cut many pieces of the same length.

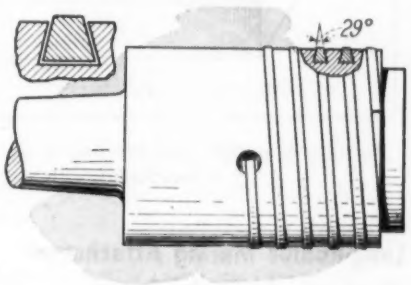
In use, the tubing is flat upon the table while it is gripped between the movable jaw and the body of the vise; the movable jaw tightens the tube against the body by turning the square headed screw.

This vise has saved a great amount of time and critical hacksaw blades, besides taking over some of the load from the power hacksaw.

In addition, it was found that the vise could handle any kind of bar stock and small parts of various shapes, limited only by the depth and the opening of the jaw, thus making it a valuable addition to the bandsaw.




A vise, made from bar stock, holds tubing and bars firmly when the jaws are closed by a square-headed screw. Lugs in the bottom of the body fit into the table slots and guide the vise toward the saw




A thread coil fits into corresponding groove in a mandrel. Clockwise rotation of the workpiece causes the coil to expand and grip the work: counterclockwise rotation releases the workpiece

## Loose Thread Mandrel Holds Tubular Work On Center

BY STEPHEN PORTER LATHROP

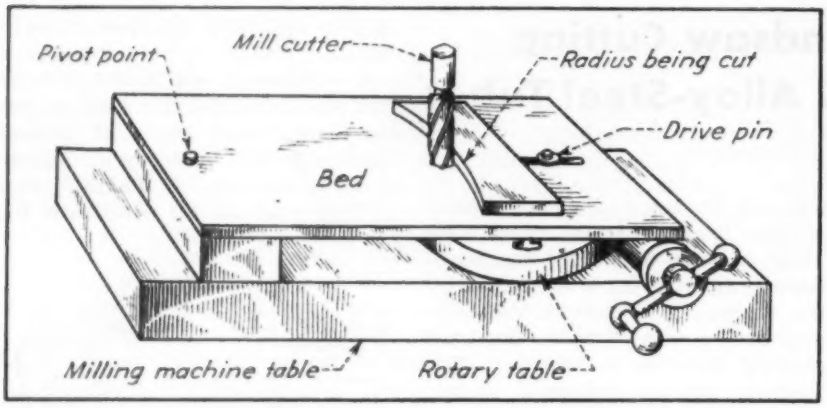
Recently, some mandrels were needed to turn pieces with holes through the center. A reverse Acme thread was cut into the mandrel; that is, a groove was machined into the surface of the mandrel, the top and bottom widths and the depth were the same as an Acme thread. The reverse thread comes to a dead end in the mandrel.

Another piece of steel of the same diameter had an Acme thread cut on it, but the center was bored out until only the Acme thread coil was left. This coil was then screwed into the mandrel with the reverse Acme thread.

Such a mandrel can be inserted readily into any object having the

correct diameter of hole, an operation quickly done by hand without the aid of any tools. Once inserted in the hole, the mandrel cannot be removed when it is turned in a clockwise direction, because the friction between the bore of the workpiece, the thread coil and the reversed thread in the mandrel tend to increase the diameter of the coil as the pressure becomes greater. But rotation in a conterclockwise direction produces the opposite effect, making removal easy.

This type of mandrel is self-tightening and self-centering, holds the work firmly, is economical to manufacture, saves setting up time and the difference in manufacturing cost is quickly repaid.




Pivoting a platen and feeding it by a worm reduction permits curves to be machined with accuracy and fine finish

## Long-Radius Milling Attachment Machines Accurate Curves

* BY JOSEPH WAHRER
Douglas Aircraft Company, Inc.,
Santa Monica

There are many occasions when a curve of large radius must be accurately machined, but only a very few pieces are required. To tie up a very large lathe, boring or milling machine runs the cost too high to make such a piece profitable, without considering the loss in productive capacity of the plant.

By the use of a bed bolted to the table of a vertical milling machine and pivoting a movable platen to it, then attaching a worm or other reduction gear to the outer end of the platen, accurate and fine feeding can be done very readily.

To cut an accurate arc, the workpiece is fastened to the platen at a given distance from the pivot, then an end mill is put into the machine. Roughing cuts can be made, then by adjusting the table to the proper distance from the pivot center to the face of the arc, a very fine feed across the curved surface will produce a smooth curve without requiring any hand finishing. Since many curves of long radius cover a small angular distance, they can be cut in one piece; if the included angle is large, then the arc can be made of a number of pieces joined together in the final assembly.

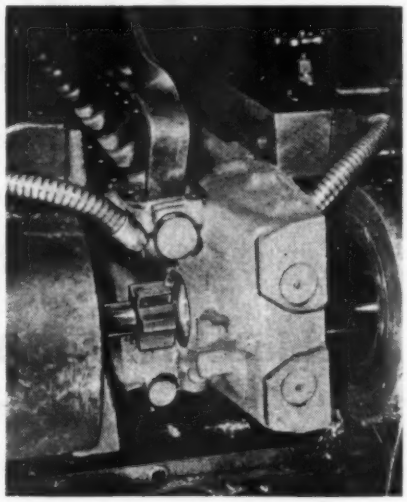
The radius of the curve is checked by measuring from the pivot point to the face of the curve and this can be done with great accuracy.

Inside or outside curves as well as slots can be made with equal ease by the use of this apparatus. *Suggestion from the Board for Individual Awards, War Production Drive.*

## Accurate Machine Tapping Replaces Hand Tapping

BY IVAN M. PETERSON
Aircraft Division
Packard Motor Car Company

The operation to be performed is the threading of a bored hole in the cylinder head of an engine. Formerly, due to the design and weight of the original tap, it was difficult to hold the machine tap true with the face of the bore within the allowable tolerance of plus or minus 0.001 in. As a consequence, the bore was threaded to a depth of one complete thread because it facilitated starting



A properly supported machine tap gave a threaded hole square with the face of the bore

the hand tap used to finish thread this bore.

By reducing the overall length of the machine tap, shortening the length of the threaded portion from 2 to 1 in. and increasing the chamfer from 22 deg. to 40 deg., with this machine tap, the bore can be completely threaded in the machine and the tolerance for squareness maintained. These modifications eliminated the uncertain hand tapping operation. *Suggestion from the Board for Individual Awards, War Production Drive.*

## Spray Gun Mask Shields Welded Joints from Paint

BY HENRY STEVENS
Marinship Corporation

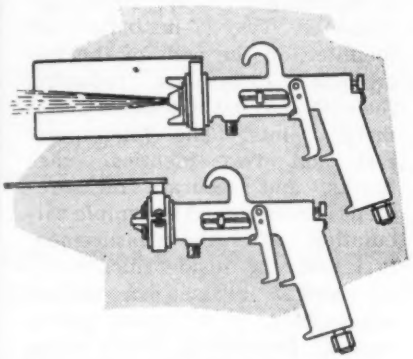
Welded joints cannot be painted until after they have been inspected, yet it is necessary to protect adjacent metal against rust in the meantime.

To prevent the sprayed paint from covering the joint and not leave too large a surface exposed to the weather, a mask was made which could be attached to the nozzle end of the spray gun.

A small piece of light sheet metal, say 6 in. long by 3 in. wide, is used as a mask. A clasp attached to one end fits over the nozzle of the spray gun and is held in place by a screw which tightens the clasp. Because of the clasp, the mask can be removed quickly or its position, whether vertical or horizontal, can

be shifted easily, depending upon the location of the welded joint to be protected.

If the shield is maintained about ½ in. from the welded joint, no paint goes beyond this point, leaving a band about 1 to 1½ in. to be painted after inspection, which can be covered by hand, against 3¼ in. to four in to be painted in by the older type of shield which was held in one hand the paint gun in the other. The previous method permitted about 2½ ft. to be done at a time, after which the shield had to be cleaned and reset.



With a mask attached to the nozzle end of the gun, close control of the coverage of the paint can be obtained and welded joints are clean, ready for inspection

The mask mounted on the spray gun permits about a third more work to be done than was the case when the hand shield was used. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

## Long Small-Diameter Pulley Fastened Securely to Shaft

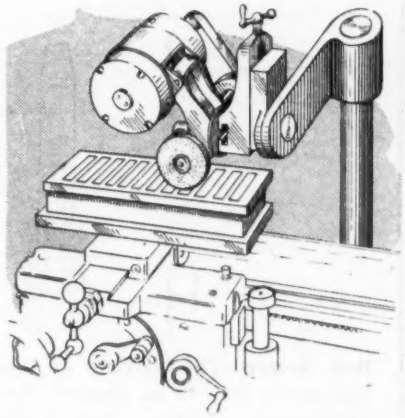
BY L. KASPER

Because of excessive vibration at high speed, a long small-diameter pulley, which was keyed and setscrewed to the shaft, would not hold tightly. To overcome this annoyance, a change in construction was made to secure a pulley which would not shake loose under such severe conditions.

The design adopted employed a piece of tubing of the correct outside diameter and taper bored ends to an included angle of 10 deg. The end plugs were tapered to fit the tubing, bored to fit the shaft, drilled for three through bolts and split on one side.

To assemble the pulley, the tubing was slipped over the shaft, the tapered end bushings pushed on the shaft and into the ends of the tube. Then the through bolts were entered into the holes in the plugs. When the pulley had been located, the nuts on the through bolts were tightened. The tighter the bolts were pulled up, the greater the grip on the shaft. The 10 deg. included angle meant that for every one pound pull on the bolt there results eleven pounds of pressure on the shaft.

With a pulley made in this fashion, setscrews and keys are not required for holding; the pressure from the tapered plugs is more secure in its holding power.



A toolpost grinder held in position by a compound rest supported by a column makes a serviceable surface grinder

## Portable Grinder Converts Lathe to Surface Grinding

BY EDSEL E. PEACOCK

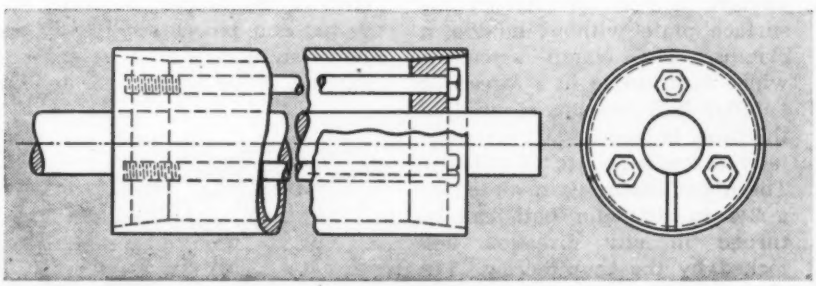
There are instances when surface grinding of small pieces would tie up a large machine and hinder production of more important parts. In such a case, it is possible to adapt a lathe to do this work with accuracy and economy, especially in a shop where a surface grinder may not be available.

To convert a lathe to surface grinding, the compound is removed from the cross-slide and a vertical column is attached to the back of the lathe. At the top of this column is a bracket for holding the compound and a toolpost grinder is mounted on the compound. A magnetic chuck is attached to the cross-slide, and the work piece placed on this chuck.

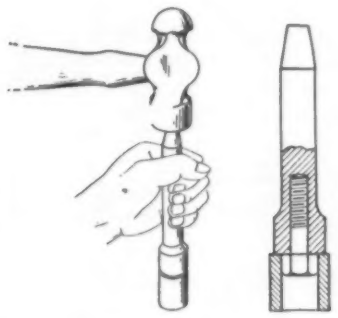
When grinding is being done, the shears or ways should be covered with cloth to prevent abrasive dust from settling upon the sliding surfaces.

To commence, start the grinder motor and feed it down until the wheel touches the work. Longitudinal feed is obtained from the carriage, transverse feed is secured by use of the cross feed and vertical feed is gained through the compound now bolted to the column.

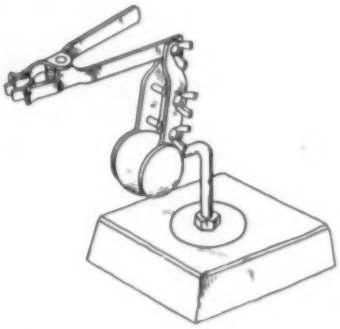
Horizontal work is moved in two directions with the lathe feeds, and the cut taken with the now vertical compound slide. Vertical surfaces are finished by moving the work transversely and the wheel vertically and controlling the cut by careful use of the longitudinal feed. By tilting the compound and using its feed and the carriage longitudinal feed, inclined surfaces of any angularity within reason can be obtained. The accuracy of the ground surfaces is equal to that of the sliding surfaces of the lathe. By dismantling the grinder and placing the compound on the cross slide, the lathe is ready for its customary service.



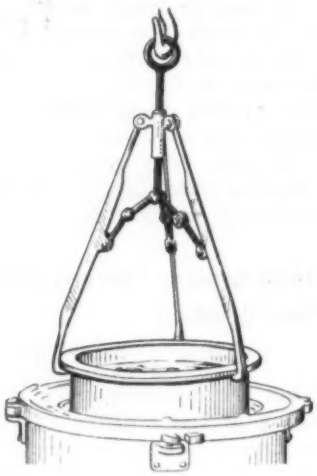
In this wide pulley, tapered plugs, split to provide adjustment, grip the shaft securely as the bolts are tightened



**Bolt Setter**—The driving of lug bolt heads into ½ in. conduit, for subsequent welding, has been speeded up by the use of a hollow steel tool which fits over the bolt and rests on the head. The bolt is then placed on top of the conduit and, by pounding the tool, the bolt is set squarely and in good position for welding. Under the previous method, in which the bolt was pounded into the reamed conduit, it did not always set straight in the pipe. *By Rex Rowland, Kaiser Company, Inc., Vancouver, Wash.*

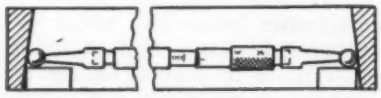


**Universal Welding Clamp**—The welding of tubes and small parts, especially those involving compound angles, has been greatly expedited by the use of a universal clamp. The base, of Kirksite or cast iron, is machined on the bottom surface and is heavy enough to rest directly on the surface plate without holddown clamps. The clamp assembly, which is mounted in a discarded annular ball bearing secured in the base, is free to turn horizontally through an arc of 360 deg. The upper assembly, mounted on a 2⅛ in. diameter ball, can be turned in any direction and locked by the thumbscrew. The clamp itself, a commercial "KV Handy Clamp," can also be swiveled and locked in any position. To use, place one of the parts to be welded in drill press vise or V-block, resting on a faceplate or other suitable surface. The other part is placed in the clamp and set to desired angle by means of a machinist's protractor. *By Emory F. Smith, Naval Air Station, San Diego.*

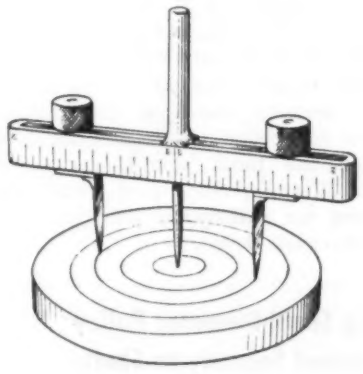


**Safety Grab Hooks**—Large round pots, or similar flanged receptacles, may be lifted with maximum safety by having three hooks hinged on a telescoping rod, with an eye to accommodate the hook on the crane. Because of this construction, the greater the pull exerted by the pots being carried the tighter the hooks lock. *By John E. Silva, Alameda Naval Air Station.*

**Tube Polisher** — An abrasive cloth-holder, made of two pieces of tubing joined by two slotted bars of flat metal, facilitates the cleaning and polishing of the exterior surface of tubes. Abrasive strips are threaded through the slots of the holder, the tube inserted and power applied by an air or an electric drill. A suitable driving arbor is incorporated in the holder. Each diameter of pipe requires a separate abrasive cloth holder. *By Floyd William Melton, Navy Dry Dock, San Francisco.*



**Inside-Micrometer Adapter** — Measurement of large inside angles was made more positive by a modification of an inside micrometer. Two ¼-in. balls were mounted on the ends of the micrometer extensions, replacing the conventional extension measuring points. The micrometer rests on two identical gage blocks, and accurate measurement is determined by simple calculation. After the measurement is taken, the inside micrometer is checked against an outside micrometer, or by other gaging means. Previously, when using conventional extension points, it was necessary to remove the gage from the grinding machine several times, to try it on a master plug gage. *By Woodrow J. Milstead, Washington Navy Yard.*



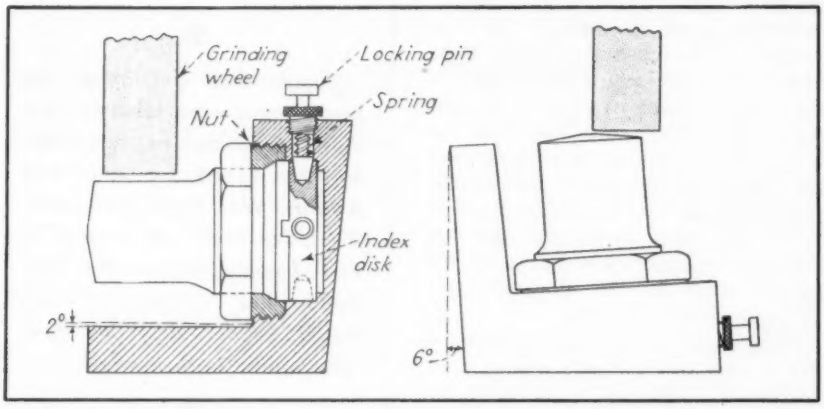
**Circle Cutter** — Much bandsaw and sanding time is saved on small lot requirements of rubber disks and washers by use of a cutting tool with adjustable knives. An arbor, with an integral center point, is welded to the graduated frame and provides means for driving the tool in a drill press. One cutter is used for cutting disks and two cutters, at different radii, are used for washers. *By Albert Kamm, Edo Aircraft Corporation.*

## Indexing Fixture for Use In Regrinding Punches

BY GEORGE KLEIN

Marinship Corporation, Sausalito, Calif.

When there are a sufficient number of punches requiring regrinding to warrant a special tool, an angle fixture is used having an indexing disk which is keyed to the punch and locked in any one of four positions by a tapered locking pin. The shank of the punch is clamped securely by a special nut bored to fit it. The base and the side of the fixture are machined parallel to the surfaces to be ground. The fixture is used with a magnetic chuck. *Suggestion from the Board for Individual Awards, War Production Drive.*




**Eight tapered surfaces, four on the sides and four on the end of the punch, are ground in approximately 20 min. by the use of this fixture**

## Eight Station Indexing Head for Automatic Milling Operations

BY CLAUDE M. HOYT

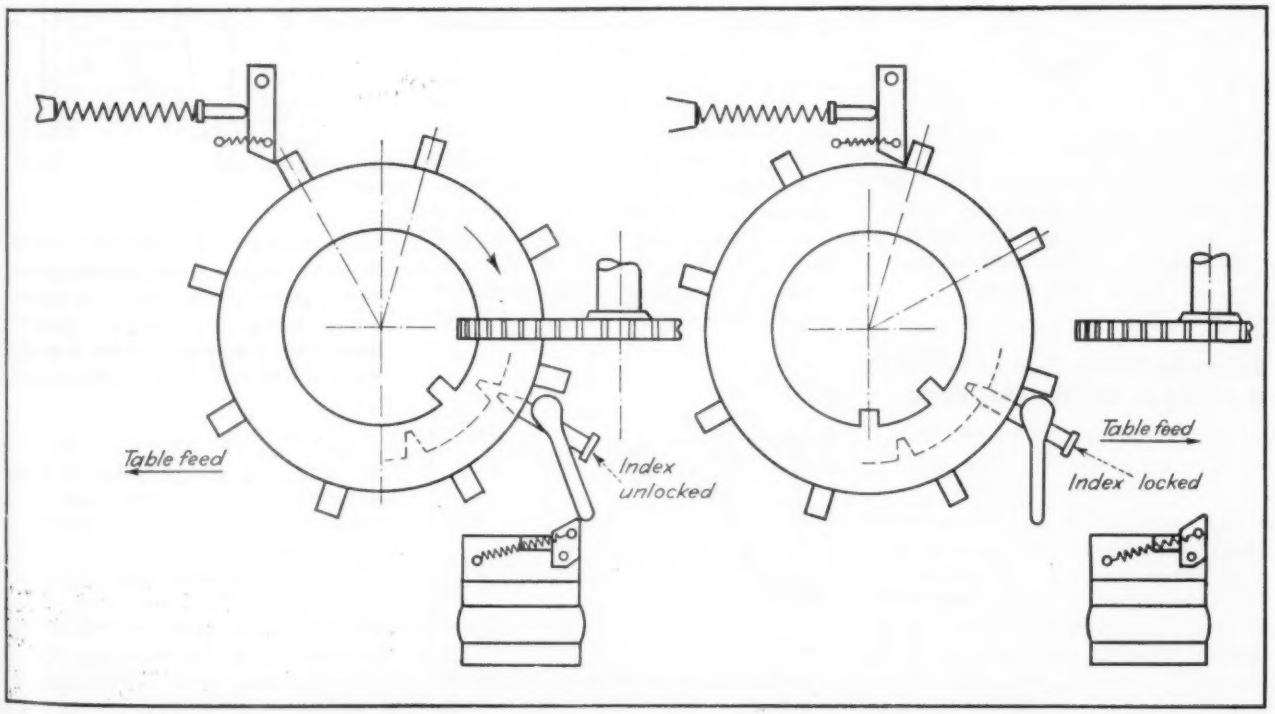
Set-Up Man, International Business Machines Corporation

A steel ring required eight slots to be milled in its circumference. The hand method had been to index each notch separately, making it necessary to stop the machine while the head was being turned. Considerable time was consumed and some scrap resulted.

By the use of an indexing head on the table, the addition of a stop to unlock and lock the head and a stop to rotate the head, the operation became automatic except for placing and removing the article to be machined.

The indexing head was arranged for eight positions which were located by a latch consisting of a conical indexing pin entering notches in an indexing disk. This pin had a spring to hold it in place during the working stroke, but there was a lever to withdraw it at the end of the stroke just before the turning of the head. The latch lever was moved by a stop attached to the overarm support. Indexing took place when a pin on the indexing head came into contact with a stationary spring-cushioned index stop fastener to the machine.

The first operation is to fasten the work piece to the indexing head, and start the machine. The table is fed toward the cutter then backed out. As the table reverses its motion, the release lever on the conical indexing pin contacts a spring latch which pulls the indexing pin out of the disk slot; further travel

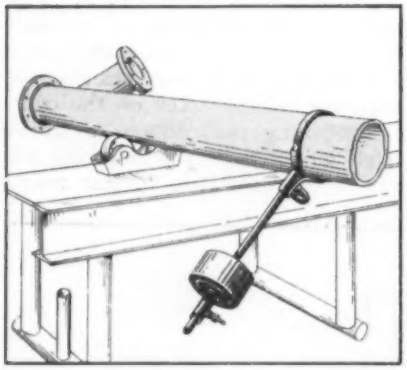



**After each cut, table reverses automatically. Left view shows indexing latch just retracted, and upper stop about to rotate head. Right view shows indexing complete with latch in place and ready for next cut**

of the table causes a pin on the indexing head to contact the stationary spring-cushioned index stop. Some overtravel is necessary to turn the index head through 45 deg. After the index stop has done its work, the indexing pin slips into its notch as the table moves the workpiece toward the milling cutter. When the table feeds into the cut, the indexing pin lever passes by the spring latch on the stop attached to the overarm support.

Other than placing and removing the workpiece the only manual operation is pushing the button to start and stop the machine; it is not necessary to stop the machine between cuts for indexing.

This automatic indexing head has doubled production by reducing the table travel and cutting time to a minimum, the parts are more uniform and scrap is practically eliminated. *-Suggestion from the Board for Individual Awards, War Production Drive.*



**With this counterbalance for pipe assemblies, the welder can steadily roll his own work and make a continuous two-pass weld, which is better and neater**

## Balancing Heavy Pipe to Facilitate Handling on the Welding Bench

BY E. I. FENTON and WAYNE SELF
California Shipbuilding Corporation, Wilmington, California

The welding of flanges on large sections of heavy pipe is usually a very strenuous job. A system has been developed whereby, regardless of bends, projecting fittings or eccentric weights, the pipe can be effortlessly rolled on the bench enabling one welder to do the whole job unaided.

The fitting consists of a radial arm which can be quickly but securely clamped to the pipe, and a weight which can be fixed at any point along the rod, permitting exact counterbalancing. Rollers can be included to prevent lateral travel if desired. *Suggestion from the Board for Individual Awards, War Production Drive.*

★

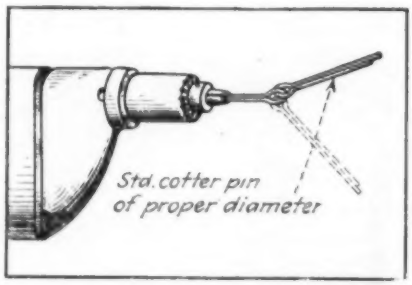
***Suggestions appearing on these pages were selected from those recognized as meritorious by the Board for Individual Awards, War Production Drive, the Navy Board of Awards to Civil Employees and the War Department Civilian Awards Board. Readers may find these ideas useful in their work.***

★

## Lapping Small Holes Quickly With Interlocked Cotter Pins

BY ALBERT SOMMERS

Lapping small bushings is done easily by interlocking two standard cotter pins, holding one of the pins in the chuck of a portable electric drill and using the other as a lapping tool. This simple method, devised recently by two employees of the Vultee Field Division of Consolidated Vultee Aircraft Corporation, is estimated to save 2086 man-hours annually. It eliminates expensive lapping tools, can be used in confined places and, through the universal joint action of the pins, has done away with bell-mouthed holes.




**Two standard cotter pins, of proper diameter, with heads interlocked, form a tool for lapping bushing holes economically**

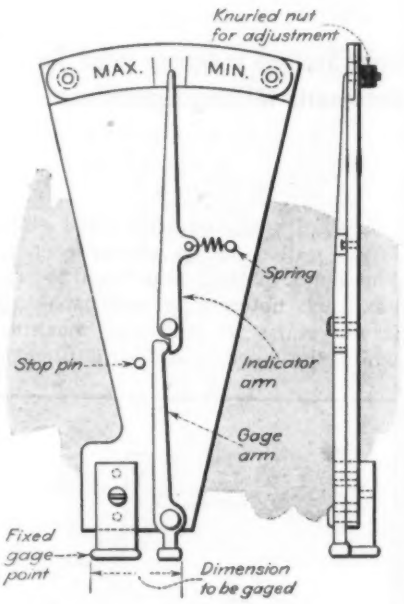
During the lapping operation, the cotter pin used as a lapping tool is loaded with fine-grit lapping compound.

## Indicator Gage Checks Limits of Inside Dimensions Rapidly

BY BERT BROWNE

An inexpensive indicator-type gage has been adapted to the inspection of internal diameters of carburetor parts at the plant of the Carter Carburetor Corporation. The size and location points of this indicator gage can be varied to suit the requirements of the parts to be inspected.

The baseplate is made from steel plate undercut for the gage plate




**Inside diameters are gaged to close limits between a fixed gaging point and a moving one which, by operating multiplying levers, greatly magnifies and indicates on a scale the slight variations in the dimension**

so that their surfaces are in line. The gage plate is adjustable to bring the scribed gage limit lines into proper register when the indicator is set to a master.

Fixed and movable gage points are assembled to the lower end of the baseplate. The gage arm is drilled to a slip fit on the fulcrum pin, as is the indicator arm. When the gage is not in use, a tension spring holds the indicator arm over to the maximum gaging position.

# Procedure for Storage of Surplus Machines

## (ANTI-CORROSION PROCEDURE)

Facility..... Inspectors

Machine Type..... Contractor.....

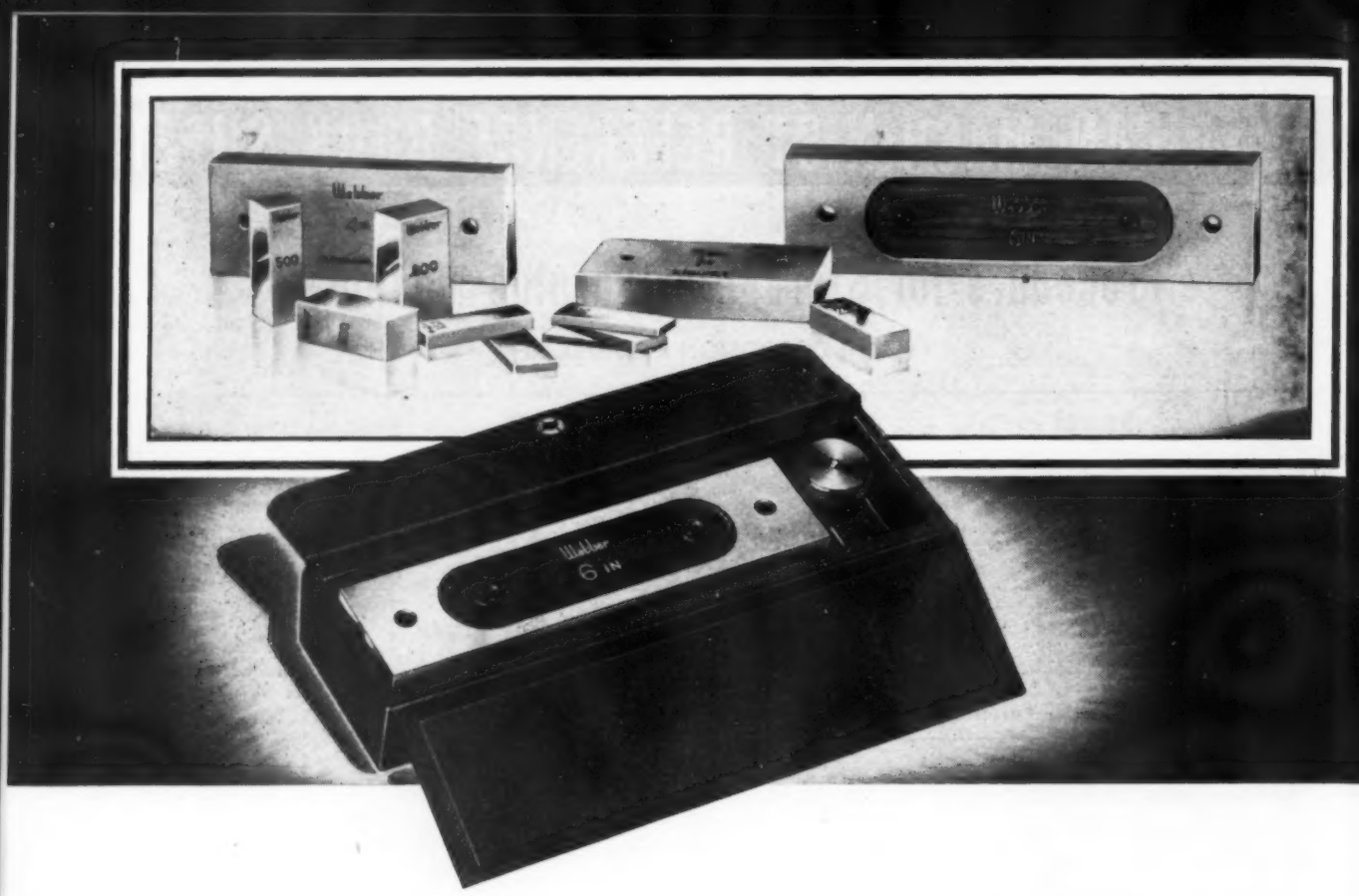
Make..... No..... Government.....

**CLASS BELOW TO BE DESIGNATED BY OWNING AGENCY**

| Extended Storage | Shipment Only | Standby Only | | Inspection | |
|---|---|---|---|---|---|
| | | In Place | Storage | Cont'r | Gov't |
| 1. Remove all dirt, chips and clean all external surfaces with neutral petroleum spirits (Fed. Spec. PS 661). Wipe dry and clean. | X | X | X | | |
| 2. Drain hydraulic system. Remove sludge. Flush clean and drain. Fill to operating level with No. 3. | Cover open reservoirs. | | | | |
| 3. Drain coolant system, clean, airblow dry: (a) *Water Soluble*: Flush with water. Drain. Airblow dry. Fill to operating level with No. 4; (b) *Cutting Oil*: Flush clean with lubricating oil. Drain. Refill to operating level with No. 3. | Drain, clean and dry. | | | | |
| 4. Drain force-feed lubricating system. Flush clean with lubricating oil. Drain. Refill to operating level with No. 3. *Journal*: oil-lubricated type: Drain. Refill with No. 3; Grease-type. Refill with routine type grease. | Relubricate only. | | | | |
| 5. Pneumatic system. Spray all interior surfaces with No. 4. | Not affected. | | | | |
| 6. Operate equipment under no load for circulation of rust-preventive compounds. | Not applicable. | | | | |
| (a) While running, apply No. 4 on all friction surfaces, ways, slides, external gears, adj. screws. Remove excess preservative. Lock all slides securely. | X | X | X | | |
| (b) Apply No. 4 on all internal dry surfaces. | | | | | |
| (c) Disconnect machine from all services. Remove all excess oil from reservoirs. Plug all open pipes. | X | | X | | |
| 7. Remove grease from gear cases. Repack. Tape all nameplates. | | | | | |
| 8. Electric motors and generators: | | | | | |
| (a) Wrap Grade A paper (Spec. JAN-P-121) around commutator. | | | | | |
| (b) Apply No. 2 to exposed shafts; No. 3 to exposed bearings. | | | | | |
| (b) Shroud with kraft paper if not totally inclosed. | | | | | |
| (d) Box small motors if not attached or well protected. | X | | | | |
| 9. Skid as required by the "Guide". | X | | X | | |
| (a) Wipe all exterior surfaces. Air blow dry. | X | X | X | | |
| (b) Relax tension devices. Remove belting and protect from oil. | X | X | X | | |
| 10. Remove accessories that will not carry well in shipment, or which project and can be damaged. | X | | | | |
| (a) Critical parts: Clean and dry. Spray or dip in No. 1 and wrap in USA 100-15 specification A or C paper. | X | X | X | | |
| (b) Non-critical parts: Clean and dry. Spray or dip No. 2. | X | X | X | | |
| (c) Box removed accessories and mark. | X | To tool crib | X | | |
| 11. Apply No. 2 to all machined surfaces and allow to set. Then at time of shipment, or loading, apply a second coat of No. 2. | X | X | X | | |
| 12. Repaint rough and painted surfaces with machinery paint. | | | | | |
| 13. Remove tape from nameplates. Identify prepared shipment. | | | | | |

*(See accompanying page for notes.)*

*Acknowledgements are made to the F. E. Anderson Oil Company, among others, for assistance in preparing the above check list.*



# When you need extra blocks for special applications

# WEBBER *Has Them*

● There are times when additional heavy duty gage blocks are needed—for example, inspection of two holes whose span is greater than 36"—or for greater distribution of blocks for inspection purposes.

Webber can furnish individual blocks to augment either the No. 24—H. D. or No. 36—H. D. gage sets. The 6" H. D. blocks and an additional eccentric clamp is put up in a neat little case, as shown—convenient for handling and protected from moisture and dirt.

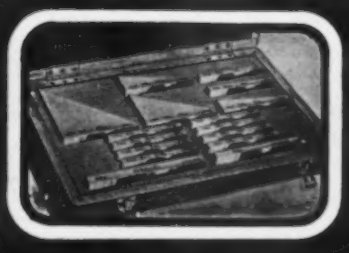
Thus Webber offers a greater range of precision measurements in addition to the easy, quick assembly of accurate measuring devices provided in the standard Heavy Duty Gage Block sets.

All Webber Heavy Duty Gage Blocks are made in one grade—accuracy—.000005" per inch of length or fraction thereof.

Sets furnished in two sizes—No. 24-HD range .300" to 24.000" in steps of .0001" and No. 36—HD range .300" to 36.000" in steps of .0001".

**Price Set No. 24—H. D.—$385.00**
**Price Set No. 36—H. D.—$450.00**

***Write for full descriptive bulletin.***



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# Storage of Surplus Government Machines

THE PREPARATION of surplus equipment for storage and shipment is detailed in the "Guide for the Storage of Plant Equipment and Termination Materials", as prepared by several Government agencies for the Space Control Committee of the Surplus War Property Administration. The specifications for anti-corrosion procedure have been reduced to an instruction sheet (on an accompanying page), which will prove useful in assuring that the proper steps are taken in preparing government-owned production equipment for storage. Details of procedure are subject to change as improved methods are developed.

1. *Importance of proper preparation.* Inspectors will exercise close supervision over the preservative measures performed at the plants of manufacturers who are returning the property to Government storage. If the production contract does not include terms for proper preparation, a supplemental agreement or a separate purchase order may be executed to provide reimbursement to the contractor for preparing the items in the manner required.

There are four classes of preparation listed in the "Guide", and these are designated by the owning agency:

(a) Preparation for "Standby Under Power". Designated equipment will normally remain in operating position, connected to the power source and ready for immediate operation.

(b) Preparation for. "Standby In Place." Such equipment will normally be disconnected from its power source, moved from its current operating position and stored in the same or adjacent building.

(c) Preparation for "Shipment". The requirements apply to machine tools or production equipment designated by the owning agency to be prepared for shipment to another government agency or to a purchaser. Such equipment will normally be shipped from one facility to another for immediate use.

(d) Preparation for "Extended Storage". When designated to be prepared for "Extended Storage", such equipment will normally be stored in indoor or outdoor storage areas and will remain there for an indefinite period.

2. *Special preparation required for open storage.* Because of the scarcity of covered storage space, it will be necessary to store many expensive machine tools and items of production equipment in open storage. It is essential that items listed for open storage be prepared in accordance with the instructions pertaining to this class of property.

3. *Skids used for protection.* The primary purpose of skids is to afford protection to the machinery while it is being handled. When it is seen that the skids specified by drawings and specifications will not afford proper protection to odd-shaped pieces of equipment, additional skidding and bracing necessary to provide full protection will be required of the contractor. Supplemental agreements or purchase orders for this additional work may be executed where necessary.

4. *Contracting for preparation.* In instances where the using contractor cannot perform a satisfactory job of preparing properly for shipment or storage, the inspector or official in charge may employ the services of a separate contractor, or perform the work by hired labor at the manufacturer's plant, separate contractor's plant or Government storage point—whichever is most expedient.

5. *Inspection prior to shipment.* The using contractor should obtain approval from the inspector for the owning agency concerning the satisfactoriness of the anti-corrosion measures applied and their compliance with provisions of the Guide. It is contemplated that a representative of the RFC will consult with the using contractor and the owning-agency's inspector concerning the suitability of the procedure followed.

**Key to Compounds Mentioned in "Procedure for Storage of Surplus Machines"**

Notes:
Letter X denotes that the adjacent operation under Extended Storage is to be performed.
Rust-preventive compounds are designated by numbers from 1 to 5. These numbers designate class of compound. Trade names of satisfactory materials are not given. They can be purchased against appropriate Federal Specifications as at right.

| Key No. | Class of Compound | Army Spec. Nos. | DPC options |
|---|---|---|---|
| 1 | Medium<br>Heavy<br>Exterior surface comp. | USA 2-121<br>USA 2-82C | <br><br>AN-C52 II |
| 2 | Thin-film<br>Polar-type thin film<br>Exterior surface comp. | AXS-673 | <br>USN 52 C18a<br>AN-C-52 I |
| 3 | Preservative lub. oil<br>Preservative eng. oil<br>Spec. lub. oil | USA 2-120<br>AXS-934 I | <br><br>USN O.S. 1361 |
| 4 | Preservative eng. oil<br>Medium lub. oil<br>Medium lub. oil | AXS 934 II<br>AXS 674 | <br><br>USN 14-0-17 |
| 5 | Ignition insul. comp. | USA 3-182 | |

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# Gaging Business

### Dealers For Surpluses

Reports from Washington indicate that the Surplus Property Board is making arrangements to license machine tool dealers to sell surplus equipment for the RFC on a commission basis. This move is not unequipment for the RFC on a comequipment have complained of the lack of experience of disposal staffs in various cities. As a result, many buyers were engaging tool dealers and manufacturers' representatives to seek out, examine and arrange for purchases of surplus equipment for them.

The increased availability of surplus tools is heightening the impatience of tool buyers in waiting for extended deliveries from tool builders for new tools. Several instances have already occurred where surplus tools have been bought when new tools were not obtainable from builders at early dates.

### Backlog Still Heavy

Although some $32,000,000 worth of business was cancelled in July and August, tool builders' backlogs totaled $210,000,000 at the end of August, equalling seven months' shipments at the low August rate of $31,000,000. September output is likely to rise closer to the recent $40,000,000 monthly rate, which would mean that the industry could promise five month deliveries, instead of seven.

The tool industry's delivery predicament is heightened by the fact large foreign orders are apparently being held up due to the desire for earlier delivery than currently seems available. This is proving costly to tool builders. Recently, the French bought $40,000,000 worth of tools in Britain, because the British could give them better delivery. In contrast to this, French purchases here thus far have totaled $30,000,000, although they are reported to be preparing to purchase an additional $30,000,000 worth of tools.

Total new orders in August were $28,000,000, before allowing for cancellations of $17,000,000 during that month, according to preliminary data.

### Industry Needs Tools

The strikes and threatened strikes in the automotive industry have not slowed down orders for machine tools, even though they have made users more cautious about purchases of cutting tools and of other materials. The worst bottleneck for automobile companies is in mechanical presses, makers of which have backlogs totaling $40,000,000. Production of mechanical presses is not much bigger than $1,500,000 a month, but builders are trying to expand as fast as possible. Conveying equipment, heating and drying ovens and plating equipment also are worrisome spots, being closely watched by automotive companies.

The rather widespread impression that automotive strikes have thus far interfered with reconversion is erroneous, except in the case of Ford, which is down because of inability to obtain parts. Three General Motors divisions have reached the point where they can produce cars within 45 days at a rate of 25 percent of the 1941 average. Another prominent company will shortly be able to turn out some 10,000 cars long before the industry had figured it could. These forecasts are made, of course, on the basis that crippling strikes in plants of suppliers will not occur. On this point, the entire industry is pessimistic.

### Labor Reverses Itself

Labor's current difficulties probably stem from its own tendency to reverse itself on basic policies, rather than from any other single reason. It will be recalled that months ago, the unions were chiding Congress that it was delaying reconversion planning, thereby tending to increase unemployment. Today, the unions themselves through strikes directly involving a few hundred thousand workers have thrown 1,800,000 workers out of jobs, more than the total number unemployed before such strikes.

The second major turn-about that labor has made since the end of the war was in respect to its stand on take-home pay. During the war, when overtime was high, the unions loudly demanded that take-home pay be ignored when they demanded increases in the basic wage rates. Now, the unions want to maintain their take-home pay, including wartime overtime, by getting a 30 percent wage increase, thus giving them 48 hours' pay for 40 hours' work.

Labor gambled that industry was so anxious to speed reconversion that it would hastily grant anything to clear the way for resumed production of civilian goods. But the unions failed to consider the fact that many industries are seeking price increases in civilian products to take care of increased costs, let alone higher wages. Industry does not know where it stands on peacetime prices, and under the circumstances cannot easily grant wage increases. Thus, the wage boost issue becomes a matter between the unions, industry, and the OPA. But it is now quite clear that the government has no satisfactory method for coping with strikes.

**Strikes Will Be A Topic** — Secretary of Labor Lewis Schwellenbach (Right) and Phil Murray, CIO head, (Left), discuss the labor-management conference to be held in Washington on November 5th. There is little question but that some way of curbing strikes will be discussed. But it is doubtful that an easy solution will develop

# "Hold" Orders Reduce Tool Cancellations to 15 Percent

**But five-month backlog may complicate delivery promises when large foreign orders hit the market. Surpluses are already cutting into new equipment sales**

CLEVELAND—Although tool builders had expected VJ-Day cancellations to pass the 30 percent mark, industry executives report that only 15 percent of the industry's backlog may wind up as entirely cancelled. This revision of prospective cancellations stems from the receipt of a sizable number of "hold" orders since VJ-Day.

This leaves the industry's backlog at the end of August at around $210,000,000, according to preliminary data issued by the National Machine Tool Builders' Association. August new orders are estimated to have been around $28,000,000 from July's $27,700,000, while cancellations are placed around $17,000,000, as against July's $12,000,000. August shipments are estimated at $32,000,000 or lower than the July low-point of $32,521,000, when foundry bottlenecks and the Fourth of July cut into production. If the industry cannot regain its previous monthly shipment rate of around $40,000,000, then its backlog is a six-months' proposition on the basis of a $32,000,000 monthly shipment rate, instead of a five-month backlog at the $40,000,000 monthly rate.

### Deliveries Vs. Surplus

Several tool builders are concerned over this delivery status, in view of the expected flood of foreign orders which might develop at any time. There are unmistakable signs that Russia, France, Belgium and some of the other European countries are poised with sizable tool orders, awaiting only the settling of financial arrangements and some clearer and earlier delivery date promises. But prospects on such deliveries are not too bright, especially since builders have been moving back delivery dates on domestic orders.

This may prove to be costly to the industry, now that surplus tools are available in growing supply. One Cleveland dealer with a rated order for three lathes, originally promised for November, 1945, was told in September that delivery could not be made until February, 1946. The dealer was forced to cull over surplus lists, where he did find lathes suitable for his purpose. Needless to say, he cancelled his original order.

### Dealers Seek Surpluses

Machine tool dealers are being asked by customers to assume the role of appraiser and detective on surplus tools. This partly stems from the lack of experienced personnel in the government surplus disposal agencies. But such a condition in the government agencies makes for a splendid buyer's market for those with a good knowledge of machine tools. It is reported that at Meadville, Pa., a government representative readily agreed to a price of $2,000 for a 42-inch vertical boring mill, in good condition and less than three years old. The value of the item was about double its sale price, but the used equipment dealer who bought it got his bargain because the selling agent had no idea what it was worth.

Machine tool builders are critical of such transactions to dealers, and not to users of the tools, since they appreciate that such surplus items will only be put back on the market later on by the dealers.

**Leaves WPB**

John Chafee, director of the Equipment Bureau of the War Production Board since May, 1945, has left the government bureau. He was formerly director of the Tools Division for two years before his last post.

# Army Experiments With Packaging Of Tanks, Special Machine Tools

CLEVELAND—Experimentation in packaging war equipment on which we were caught short at the start of World War II is being undertaken by the Ordnance Department of the U. S. Army.

Right now five or six companies, including Goodyear Aircraft, Chrysler and Martin, have both the medium M-18 tank and the larger M-26 in their hands. These companies are accumulating data on the cost and "know-how" of dismantling these tanks and packaging them so that they can be placed away in storage so they would be available should the occasion ever arise when they might be needed again.

Goodyear has received three of the smaller tanks and are doing an engineering job now on devising a package for these tanks. One tank has been dismantled and encased in three crates, one into two crates and the third into one crate. Following the experimental work, the job of packaging an undetermined number of tanks will be let out on contract, according to present plans.

Plans have also been made whereby the same procedure is to be followed by the Ordnance Department for the storing of special machine tools, used wholly for Army work such as turning out shells, cartridges, etc.

If the same plan is followed for tools, they will be dismantled and crated with a welded airtight covering of aluminum placed around the crate. Air will then be replaced with either nitrogen or helium, a supply of silica gel placed in the container to absorb any possible moisture that might be present, and then the package sealed.

Once made airtight, Ordnance officers state, packaged tools, tanks and all other war supplies can be stored anywhere and will not even need the shelter of a roof.

## 66% of Labor-Management Committees to Continue

WASHINGTON—Of the nation's active Labor-Management Production Committees, 66 percent of those responding stated that they planned to continue after the war, according to a recent survey by War Production Drive Headquarters. Only seven percent said they would not continue while the rest have not made a decision as yet.

Having made a valuable contribution to the nation's war effort, the committees' program for the present transitory period covers such pertinent problems as: increasing and improving production, changes in production schedules, contract terminations, reduction of absenteeism and labor turn-over, and conservation of tools, and materials.

# Detroit Letter

### Ford Changes

Less than a week after Henry Ford II took over the presidency of the Ford Motor Car Co., the most portentous move was made in the great Ford empire since Henry, the elder, retired in 1918 and made his late son, Edsel, his successor. Harry Bennett, who has in some quarters been marked down as the real ruler of the vast empire, has stepped aside from active control.

In his place has stepped a new figure, John Bugas, the former Detroit "F.B.I." chief who only a short time ago retired from his government job to join the Ford staff. Bugas becomes head of the all powerful industrial relations staff. Bennett will remain on the Ford board of directors. He is expected to leave that on January 1.

With Bennett toppled from power, Ray R. Rausch, once slated to become the Charles Sorenson of the Ford Co., will be in charge of the construction of the new Ford assembly plants. Raised up is M. B. Bricker, former head of Willow Run who has been in a standby post while the maneuvering went on. He will be in charge of all manufacturing, according to official announcement of the changes.

So far, other executives and the board of directors remain the same as before the ascendancy of young Henry. Until the move that came as a distinct surprise, although rumored many times before, the second stepping aside of the elder Ford for a younger member of the family had little meaning. As long as Bennett remained in his powerful post, changes at the top meant little.

Now all this appears changed. Henry Second is seen as using the power that has been given him to make some changes in his immediate industrial family. How far that will go remains to be seen. But it is a start that may have wide repercussions in the days to come.

### Few 1945 Cars

Estimates of automobile production this year are being revised drastically. After the lid was taken off by the War Production Board, the industry planned to double its 241,000 initial starting rate by the end of the year, with an even sharper increase in the first quarter of 1946.

Now observers believe the industry will be very lucky to get 175,000 cars out of the plants before January 1. Whatever the figure will be, it will not even be a dribble compared to what might have been done with the right conditions.

### Parts Makers Lagging

Two other factors are also posing big problems in the industry. One is the failure of the parts makers and suppliers to get in step with the rest of the industry. Some are not yet in a position to fill orders and are holding back the manufacturers on vital items.

Dodge Truck, for instance, before it went down due to a strike, was sending its products off the assembly lines with items missing on the dashboard and sometimes under the hood. The assembly was being completed out in the yard when the missing parts dribbled in.

Others likewise have been on a hand to mouth basis. Some of the suppliers have been coping with continuing war orders.

### Prices Confused

The other factor that has given the industry additional wrinkles is the matter of prices. The "simple" formula handed the manufacturers is so involved that they have not yet succeeded in decoding it sufficiently to make price application. Some of the ingredients are still missing and won't be supplied until the wage question is settled.

One thing is almost certain, the fond dream of the OPA that 1946 prices will be at "about the level" of the 1942 prices will blow up in a nightmare. None of the manufacturers can see where they can maintain the price level with everything else up. Breystadt revealed that Cadillac suppliers are asking from 15 to 25 per cent more for their products.

That has brought about a peculiar situation. The suppliers are shipping on memos with prices to be set later. It was suggested that cars might also be sold on that basis, to be delivered at a price to be determined sometime later.

### Reconversion Well Along

If labor costs and prices could be pinned down, the industry would be in pretty fair shape. Reconversion is about over. Plant clearances have moved along at a good clip. Claim settlements are moving along much faster than anticipated.

There are still some machine tools to be gotten but most companies are in good shape on that end. Only Willys will be held back on its passenger car by lack of machine tools. It has been unable to get body presses too and the company seems destined to lag behind the parade.

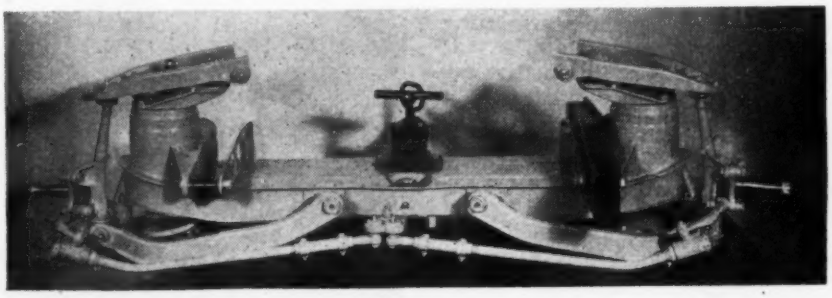
All others have moved into position to start sometime this month.

### More New Lines

Cadillac announced its 1946 line on September 23 and was followed by Pontiac and Buick. The Cadillac model is said to embody 63 improvements but the lines are very similar to the 1942, as are the Pontiac and Buick.

Principal improvements in the V-type Cadillac engine are more enduring main bearings and connecting rods, new three-ring pistons, a new carburetor and throttle controls. The hydra-matic drive, improved through experience in the light tanks that the company built during the war, has new bearing for longer life, improved internal lubrication, wider bands and fewer parts.

The 1946 Pontiac claims 27 mechanical advancements and will again be available in six and eight cylinders. The grille has been redesigned and parking lamps relocated.



**New Nash "600" Front End Suspension**—Major change in the "600" Nash is the adoption of parallel arm-type front wheel suspension to replace the former knee-action type. The suspension is a self-contained subassembly, attached to the body structure by four rubber-encased fastenings, and it can be removed in its entirety for repair or replacement. A king-pin is used as the connection between the upper and lower supporting arms, thus eliminating considerable unsprung or "dead" weight. The top and bottom bearing points of the king-pin are much farther apart than conventional, reducing the load on the bearings and maintaining wheel alignment longer

# Auto Strike, Worst Since 1937, May Continue Unsettled

**Feeling is that UAW pulled boner in announcing that it would hit auto companies one-by-one, only to have an unscheduled strike at Kelsey-Hayes upset its plans**

DETROIT—The automotive industry is in the preliminary stages of what promises to be the most troublesome labor difficulties since the 1937 sitdown strikes. Motor car makers have no intention of granting the 30 percent blanket increase in hourly rates asked by the United Automobile Workers and are in no hurry to make any kind of settlement quickly that involves a change from present levels.

Chrysler has had a meeting with union representatives to talk about a new contract and other meetings will be held over a period of weeks. General Motors and Walter Reuther have not yet begun their negotiations. Meanwhile, Ford is down because it cannot get vital parts and its production program is being delayed thus sacrificing much of the initial advantage that it was reputed to have over its competitors in speed of reconversion.

### UAW Judgement Poor

Industry leaders feel that the U.A.W. made the greatest error of judgement in the union's history when it announced a war against the manufacturers and said that the tactics to be used would be along military lines, picking off one manufacturer at a time starting with General Motors. Immediately after this public declaration by the union, Ford involuntarily shut down.

The union has proved, time and again, that it is important to control the actions of its own locals if it should try to pull a strike at General Motors and concurrently keep all other companies operating. The industry believes the plan will fail for the simple reason that unexpected strikes will break out in companies supplying GM's competitors thus closing them down. These are not much concerned about what the international union officers say or do.

### Pressure From Ranks

It is believed in the automotive industry, that the U.A.W.'s timing of its militant program and strike threats is poor. If the union had waited until reconversion and actual car production were farther along, the industry would be caught in a tighter predicament. There is good reason to think that the union was forced by pressure from its own rank and file to take action now rather than later and that union leaders despite tough talk do not expect to get a 30 percent advance and realize that such a demand is beyond reason.

Neutral observers are of the opinion that the eventual outcome will be a compromise whereby the companies will grant increases of 10 to 15 percent. The Studebaker agreement with the union does not set a pattern for the industry because Studebaker's incentive pay system differs from the rate structure in the remainder of the industry and because the union has declared that the settlement at Studebaker won't stand anyway as it is not enough gain.

### Strike Issues

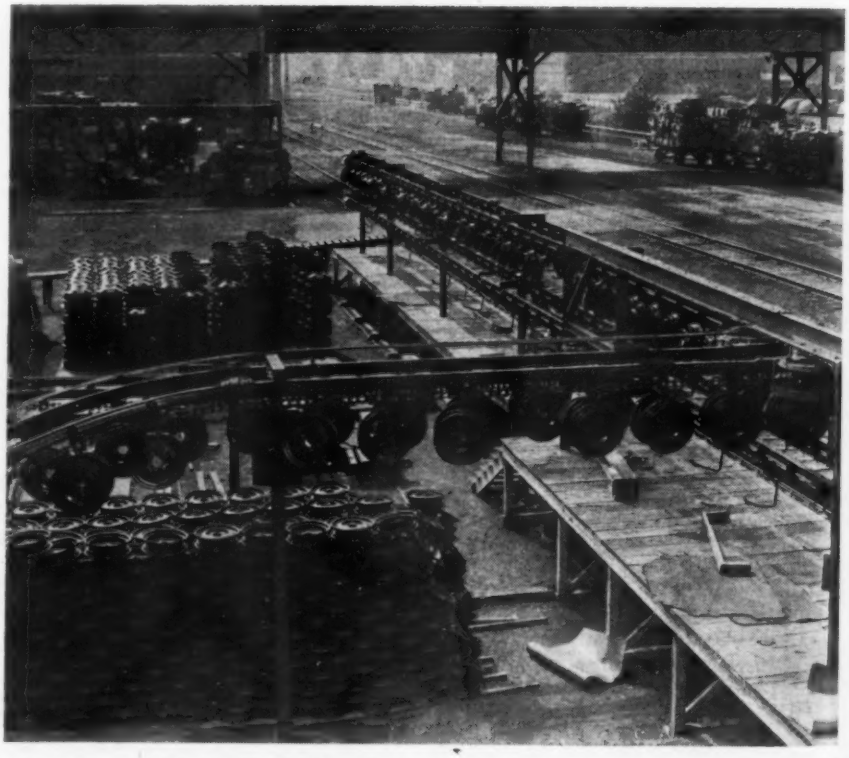
Above even the wage issue in importance to the automotive industry are two other factors: (a) guarantee by the union of uninterrupted production after a contract is signed so that stability of operations can be attained and (b) the right of management to discipline its own employees and run its factories without interference from the union. The latter factor has been the real issue in the much publicized Kelsey-Hayes strike. The industry has its fingers crossed regarding any guarantee from the unions against contract violations because experience has proved that the U.A.W. in particular does not have enough control over its locals to maintain proper discipline. Automotive manufacturers feel that the labor situation, bad as it is today, will get considerably worse before it gets better.

## Some Auto Firms Won't Use NE-Steels; New Brake Lining

DETROIT—Some auto manufacturers may not use "NE" steels in the near future, not because they do not have the service performance characteristics, but in order to simplify heat-treating.

For many years, there have been two schools of thought on heat-treating in the Detroit area. One selected the steels very carefully and used as few ranges of heat treatment as possible, while the other adapted the heat treatments to meet as narrow a range of steels as could be purchased on the open market.

Naturally, the steel which will give the physical properties needed and still stand the widest variation in heat-treatment without loss of the necessary physical characteris-



**The Cause**—With only a few hours' supply of wheels, shown in the foreground, the Ford Motor Company was forced to halt operations on September 17. Its wheel supplier, the Kelsey-Hayes Wheel Co., was strike-bound

tics, is the most "fool-proof" in the shop. That is why the special alloy steels will probably have a revival.

Several new automobiles will probably have brake shoes with the moulded lining not riveted but cemented onto the shoe. This should more than double the brake life and prevent scoring the brake drums, because the rivets are absent. The linings are cemented to the brake shoes by the application of heat and pressure. The cement being the same as used in Cycle-weld, a process developed by Gordon Saunders of the Chrysler Corp.

## Studebaker Reconversion Features New Tools Patterned on War Types

SOUTH BEND, IND.—Reconversion plans, involving expenditures of some $16,000,000 for new equipment and facilities planned for the Studebaker plant will include installations of batteries of fast, semi-automatic machinery, largely modeled after types used by the company in making Flying Fortress engines.

Many planned changes incorporated in the company's reconversion program are outgrowths of Studebaker's wartime experiences. A few examples are the extended assembly lines for truck production (carrying over the wartime Army truck production line), and a milling machine for auto and truck cylinder blocks that copies the special machine used for aircraft engine cylinder blocks.

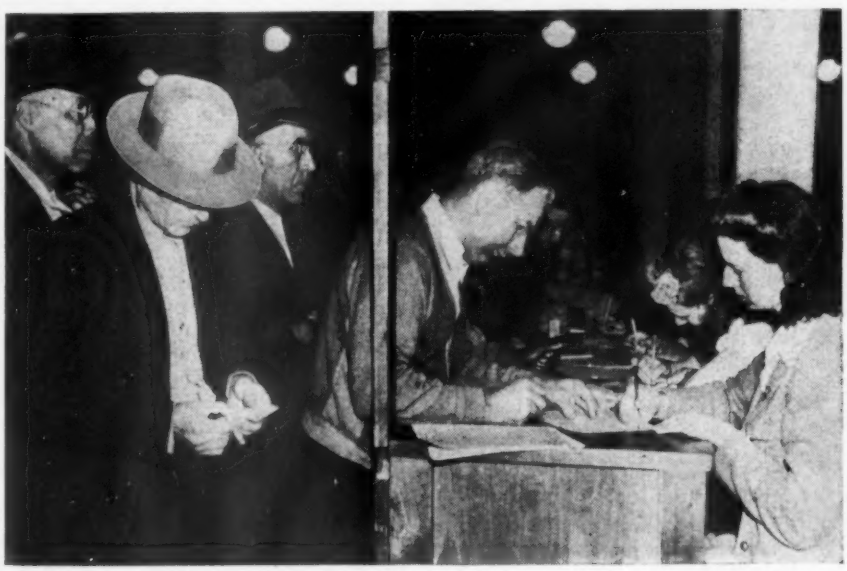
The converted plant layout will entail removal of all cast iron machining to a position nearer the foundry.

New machinery purchases will include six new 350-500 ton presses, and a 27-foot long multiple milling machine that automatically loads, clamps, and ejects cylinder blocks, as valve and bearing locks are rough and finish-milled. Another new machine will grind simultaneously three of the four main Champion bearings, the oil seal diameter and gear fit.

New equipment for precision boring of cylinder barrels with carbide tools will provide truer surfaces but reduce honing. A new gear-hobbing machine will operate on four camshafts at the same time, while several automatic cam grinders automatically index and precision grind camshafts.

Flywheels will be plunge cut by a new method developed in aviation engine production. New spindles for all grinders of a type used in aircraft promise greater accuracy, less chatter and lower upkeep expense. Twenty-nine new spot welding machines will carry attachments for the precise adjustment of the depth of body and frame welds. Another new development is a three-headed, rotary type machine that grinds both the top and bottom of the clutch housing (formerly one side was ground while the opposite side was milled, requiring the operation to be repeated).

The new plant layout will involve the rearrangements of these types of equipment mentioned, and conveyor systems are being changed.



**The Effect**—Because 4500 workers at the Kelsey-Hayes Wheel company went on strike, the Ford Motor Company was forced to cease production and lay off 50,000 workers. Here are some former Ford workers, the unwilling victims of the Kelsey-Hayes strikers, registering for unemployment pay

*Dan Harrington*

### PRESS COMPANY FORMED

NEW YORK—The Reliance Hydraulic Press, Inc., has been formed as a New York corporation capitalized at $250,000 to manufacture and sell hydraulic presses. Dan Harrington, president of Harrington, Wilson & Brown Co., machine tool distributors, is president of the new company. F. D. Van Lew, long associated in various leading organizations, is vice president, while Thomas Amendola, president of the Tamco Mfg. Co., is secretary and treasurer. The executive offices of the new company are located at 405 Lexington Avenue, New York City.

### Wage Increase For USWA Would Raise Steel Prices

NEW YORK—The steel industry cannot grant the CIO a $2-a-day increase without raising steel prices, according to a statement made by Benjamin F. Fairless, president United States Steel Corporation. Margins between costs and profits have been narrowed down about $7 to $8 a ton, he stated, so that today the steel industry is losing money on two-thirds of the tonnage.

Mr. Fairless pointed out that the average hourly rate is $1.15 an hour, with overtime bringing it up $1.30 an hour. The CIO's requested raise works out to 25 cents an hour, and would increase production costs by $6 a ton.

### Foreign Patents Available For Reconverting Industries

CHICAGO—Firms interested in entering new fields in the reconversion period will find helpful ideas among the thousands of patents seized by the Alien Property Custodian, hundreds of which relate to the metalworking industry. Inventions of foreign origin extend over the entire field of milling, punching, drilling, profiling, welding, heat-treating, grinding and similar operations.

# Two Percent of $16,000,000,000 in Surplus Plants Sold or Leased

WASHINGTON—Disposition of the government's $16,000,000,000 worth of industrial plants, nearly one quarter of the nation's total industrial facilities, will be one of the biggest business deals in history. The manner in which it is done can mean the difference between prosperity and regression, and it will be equally vital to the metal working industry.

Latest move of the Surplus Property Board, high policy maker on all domestic war surplus disposal, is Regulation No. 10, which gives no preference to contractors in possession, and opens wider the way for small business and ex-service men.

### Employment A Factor

The government's aim is quick and extensive employment of millions out of uniform and war plants. Maximum production for better living standards and prosperity is the other major objective.

Aid is extended to small business and veterans by authorizing the Smaller War Plants Corporation the power to purchase plants under its priority (exercised by all federal agencies) for re-sale or lease. Cases in which the government owns only part of a facility will be studied with a view to subdivision and multiple tenancy.

### Speculators Barred

Precautions are taken against speculators, who would obstruct quick conversion and employment. Applicants must certify that they are not acquiring the property for resale or lease.

Aluminum, magnesium, rubber, chemical, aviation gasoline, iron and steel, aircraft, and shipbuilding plants costing more than $500,000 cannot be sold except with approval of SPB. Sales of plants worth $1,000,000 or more must be cleared with the Department of Justice. That is a precaution against monopoly, and you will hear more about it in the forthcoming congressional revision of surplus property law. In some fields the government owns nearly all the production facilities, and the disposition of same will be closely scrutinized for affect on the industry and on the country. For example, 98% of synthetic rubber capacity is federal property; the U. S. owns 90% of aircraft facilities; 90% of magnesium; 55% of aluminum capacity.

The pricing policy is a flexible one. A new Special Order No. 19 says that selling prices of plants shall be arrived at "by negotiation and shall be determined by actual proposals received and by consideration of the use of the property most desirable in the light of the objectives of the Act." A formula is provided to determine "fair value," but it is to be used only on sales to federal agencies. Pricing policy is a broad one, and if it serves its intended purpose, it will also serve politicians and fixers.

### Sales Limitations

Of course many ordnance, shipbuilding, and other plants owned by the Army, Navy, and Maritime Commission, will not be offered for sale. In some cases, the armed services will declare plants surplus only if they can get agreements that purchasers will manufacture a specified product. Many plants are so designed, or so located, that no one would want them. The atomic bomb plants in Tennessee, Washington, and New Mexico, even if the government were through with them, would find no takers.

It's academic now but unoccupied facilities of this war could deeply affect the country in future. In time of serious unemployment, the government might be tempted to set up production projects in idle plants, to make work, and from such an acorn could grow federal industry, just as a public power system grew in Tennessee from the small beginning of Muscle Shoals.

### $45,155,000 Sold

RFC last fortnight made public its first progress report on the disposal of plants. It shows that 34 plants, costing $45,155,000 have been sold for $33,552,000, 62 plants costing $285,182,000 have been leased; lessees of 16 additional plants have indicated intention to purchase them under options; 61 plants are in progressive negotiation toward sale or lease; one or more parties have expressed interest in buying or leasing 469 additional plants. The total of 642 mentioned in the report are somewhat less than the total which RFC wants to sell, which indicates something like 1500 plants are for sale.

Cost of plants sold range between $30,000 for a magnesium casting facility to $6,538,000 for an iron and steel products plant. RFC explains that negotiations were started before V-E day on some properties, to hasten conversion and re-employment. Temporary leases have been entered into, while negotations were under way, to prevent shutdowns.

The report gives name of wartime lessee, location, product manufactured, purchaser, cost, and sale price of plants sold, and similar data on plants leased and in negotiation.

# Tool Manufacturers Financed 56 Percent of $160 Million in Wartime Expansions

WASHINGTON—Government data indicates that tool builder financed 56 percent of the total plant expansion in the industry from May 1940 to July 1945. The total value of such facilities expansions amounted to $159,849,000, including $47,910,000 for construction, $109,590,000 for equipment, and $2,349,000 in other costs. Of this, the industry itself financed $29,754,000 in construction, $59,024,000 in equipment, and $974,000 for other costs, totaling $89,752,000. The government furnished $70,097,000, of which $18,156,000 went for construction, $50,566,000 for equipment, and $1,375,000 for other costs.

### Few Sales Made

Up through late September, only three sales of government-owned machine tool manufacturing facilities had been made by the RFC. The only option taken up so far was by the W. F. and John Barnes, Rockford, Illinois, who purchased facilities costing $552,145, at the same price. The Micromatic Hone Company, which had an option on some $395,000 government facility, did not exercise it, but instead negotiated the purchase at $325,000.

The Elkay Manufacturing Company, Chicago, bought for $230,000 a $224,000 facility operated by Ostrander-Seymour, Cicero, Illinois. Although other purchases are being negotiated, such transactions are not divulged by RFC until completed.

### HOW TO ACQUIRE SURPLUS PLANTS AND EQUIPMENT

1. Ask local RFC office, or banker for information on plants available in your region.
2. Describe the type plant you want, and RFC will help you find it.
3. Specify the kinds of machine tools or other equipment you will need and RFC will help you select from surplus.
4. Ask RFC to let you inspect any plant that might be suitable.
5. Ask for explanation of terms which RFC may extend to help you.
6. Primary consideration in surplus plant disposal is jobs; show how your project will create employment.

# Washington Bulletin

### Foreign Surplus Wrangle

Mountains of surplus war property will weigh on the economics and politics of this country and of others for years to come. So that the vast wealth of U. S. surplus abroad can be used most effectively as an instrument of foreign policy, the State Department has taken over top control in the disposition of six billion dollars in goods in the European theatre alone. These goods will be used now, while they are in great demand, to promote foreign trade concessions and military bases. Army-Navy Liquidation Commission and the Foreign Economic Administration will continue as operating agencies, under the direction of the State Department.

W. Stuart Symington, Surplus Property Board chairman said the transfer of authority to the State Department would make SPB "just a recording agency" as far as disposal of property abroad is concerned. That's about all it was anyway. Months ago control of foreign disposal was grabbed from SPB by Army and Navy, for approximately the same reasons that the State Department now takes it from the armed forces; both want to use it as influence on foreign countries. SPB retains full control of domestic goods disposal, but, as in the case of foreign-based surplus, it will be bandied in policy maneuvers for years to come.

At this moment Congress is squaring off for a battle. The big questions are: whether to unload supplies in the interest of quick employment and in many cases against the interests of manufacturers; to what extent to favor war veterans with prices and priorities; how the present administration can best use disposal to get itself re-elected; to what extent the piled-up wealth shall be diverted to social purposes.

### Atomic Bomb Worries

The possible effect of atomic bombs on future warfare is causing much uneasiness among military and munitions industry officials. The public tends to believe that all you need to win a war is three airplanes and three atomic bombs, and there is just enough truth in it to make Congress question early-future commitments for large sea, land, and air forces. Recent reports that important bomb cost reductions and increased destructive power are imminent, serve to aggravate the uncertainty. Particularly aircraft manufacturers, and a few other industries, who have always subsisted on military contracts, are worried. Some of them are anxiously coaxing military authorities to say that wars will be fought with planes, guns, and ships, as usual.

Not only war but peace is made uncertain by the little atom. The War Department recently permitted W. M. Kellog Company to say that more than 5000 new products and processes affecting all phases of American life will be available to industry as a result of government atomic research. Among industries affected were mentioned: petroleum refining, general chemical and processing, pressure and vacuum containers, high vacuum, gas processing, electrical, refrigeration, and industries employing corrosive chemicals. Somewhat on the academic side, but worth note, is the comment of some basic research men that the atomic structure of metals and elemental matter may be changed or converted from one thing to another.

### Floating Bridges

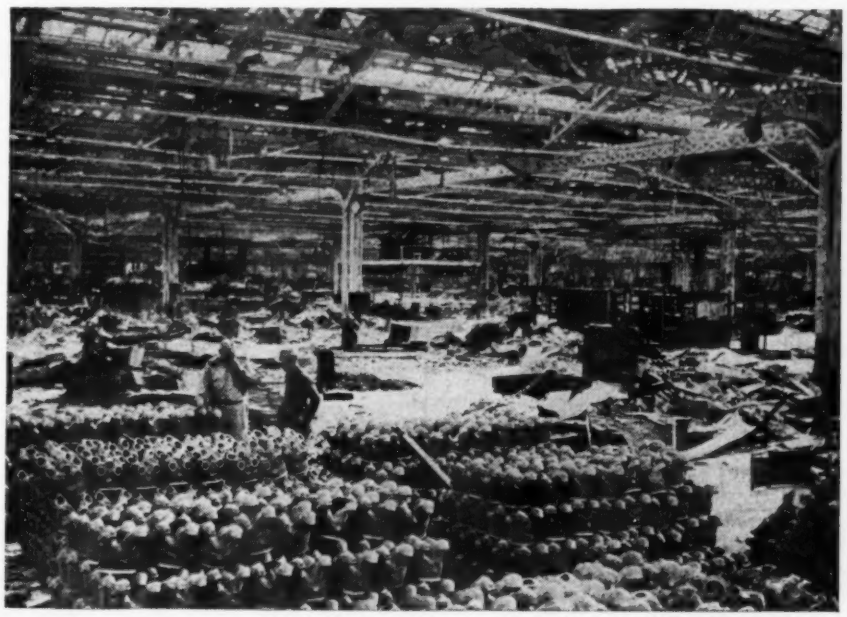
The British Admiralty announces that R. M. Hamilton, an employee of the Royal Navy, has developed floating bridges, platforms, and airplane landing strips, supported by multiple hexagonal drums, which are arranged so as to move up and down with water motion. More revolutionary is Hamilton's discovery that fabric, stretched over water, harnesses a wide area of surface tension (which enables a needle to float) and will support heavy loads, such as trucks. Tests resulted in application of the principle in the invasion of Europe.

### War Production Board

Industry advisory committees are being retained "on call" till the War Production Board is liquidated. Over-all type committees, like the Construction Machinery Industry Advisory Committee, are on call, but segment committees, like that on snow plows, are dissolved.

### Nazi Aircraft Data

Engineering data on German aircraft have been released by the British and by the U. S. Presumably the Russians took possession of some data that is not included. The 137-page document was compiled by the Army's Wright Field air laboratory and is available to the public. Most of the information was obtained by U. S. and British air intelligence agents under fire, and some was wangled from captives after peace. Maj. Gen. Hugh J. Knerr, chief of Air Technical Service, says the data was of great value in the fight against Germany but is not worth much now. He deplored the fact that the Army did not have funds to obtain the information before the war, and said that it was very costly to obtain in combat. Aggressive research from now on should provide continuously up-to-date engineering data in all phases of aviation.



**Bomb Created Havoc in Jap Plane Factory**—Destructive force of the B-29s on Jap industry is evidenced in the above photo of the Mitsubishi Aircraft Plant in Nagoya. Undamaged cylinder castings in the foreground failed to reach the final stage of completion in finished engines.

# Russia Received 59 Percent of U. S. Tool Shipments Under Lend-Lease

WASHINGTON—Over 59 percent of lend-lease shipments of machine tools from March 1941 through March 1945 were destined for Russia, according to an analysis of Bureau of Census figures on such shipments. The total value of all lend-lease tool shipments for the four-year interval was $675,017,000, (or 18 percent of total U. S. shipments from 1941 to 1945) of which $398,228,000 represented shipments to Russia.

Great Britain was the second largest recipient with a total of $195,519,000, Australia was third with $36,102,000, while India was fourth with a $22,333,000 total in machine tools. The total for Brazil was larger than some observers had expected, but it is reported that most of these tools were for the purpose of helping to arm that country.

The pattern of the dire need of our Allies can be traced in these lend-lease tool shipments. In 1942 and 1943, when Britain had suffered from the Nazi blitz, American tools helped the reconstruction of its production facilities, and by 1944 the volume of need was greatly reduced due to the operation and output of its own plants. The German invasion of Russia and the destruction of its industries in the Ukraine accounted for the Soviet's heavy call upon American tool builders in 1943 and 1944. Tool shipments to Russia in 1944 represented 36 percent of the nation's total output at a time when heavy domestic military demands were piled high in the industry's backlog.

## Steel Demand Unaffected By Strikes In Consumers Plants

PITTSBURGH—Labor difficulties in other industries do not yet seem to have affected the steel mills from the standpoint of demand. One possible explanation is that steel consumers faced by their own labor troubles may be trying to head off future delivery difficulties in the event of a strike in the steel industry over current wage demands.

In any event, sheet and strip demand is unprecedented and mills are allocating tonnages; tin-plate and wire mill schedules are booked for many months ahead; orders are increasing in small bars, pipe and shapes, and the lowest point in plate demand is now passed.

While the industry is studying the CIO's demand for a general wage increase, individual companies are fighting a new outbreak of small and so-called unauthorized strikes. These nuisance walkouts are taking up a large amount of management's time which could be better devoted to production planning. One steel company had eight strikes going on at one time, ranging from difficulties in its coal mines to a few men out in a finishing mill.

While the spot strikes in steel mills are cutting into tonnage output, the industry is gravely concerned over coal mine stoppages. The reserve coal supply at most steel mills has been very low.

Some observers believe that the steel workers will get some kind of a wage increase, but less than they are asking for, provided that the industry is granted price increases needed regardless of what happens on the question of wages. Poor third quarter earnings may hasten OPA action on prices.

### LEND-LEASE EXPORTS OF MACHINE TOOLS

(thousands of dollars)

| Country | March 1941 through March 1945 | 1941 | 1942 | 1943 | 1944 | First Quarter 1945 |
|---|---|---|---|---|---|---|
| Great Britain | 195,519 | 7,124 | 75,997 | 87,835 | 23,731 | 832 |
| Russia | 398,228 | —— | 34,560 | 153,532 | 184,072 | 26,064 |
| Canada | 339 | 35 | 51 | 8 | 190 | 55 |
| LATIN AMERICA | | | | | | |
| Bolivia | 123 | —— | 3 | 114 | 5 | 1 |
| Brazil | 6,602 | —— | 47 | 3,146 | 2,816 | 593 |
| Chile | 682 | —— | 3 | 308 | 362 | 9 |
| Mexico | 360 | —— | —— | 23 | 283 | 54 |
| Peru | 547 | —— | 8 | 242 | 294 | 3 |
| TOTAL 5 NATIONS | 8,314 | —— | 61 | 3,833 | 3,760 | 660 |
| ASIA | | | | | | |
| China | 169 | 13 | 41 | 101 | 7 | 7 |
| India | 22,333 | 206 | 4,307 | 8,949 | 8,367 | 504 |
| TOTAL 2 NATIONS | 22,502 | 219 | 4,348 | 9,050 | 8,374 | 511 |
| AFRICA | | | | | | |
| Algeria | 1,659 | —— | —— | 2 | 1,446 | 211 |
| Egypt | 2,976 | 182 | 1,494 | 968 | 300 | 32 |
| Union of South Africa | 4,610 | 7 | 642 | 2,266 | 1,635 | 60 |
| TOTAL 3 NATIONS | 9,245 | 189 | 2,136 | 3,236 | 3,381 | 303 |
| OCEANIA | | | | | | |
| Australia | 36,102 | 171 | 11,596 | 21,584 | 2,634 | 117 |
| New Zealand | 934 | —— | 122 | 533 | 266 | 13 |
| TOTAL 2 NATIONS | 37,036 | 171 | 11,718 | 22,117 | 2,900 | 130 |
| ALL OTHER NATIONS | 3,834 | 6 | 566 | 1,971 | 1,006 | 285 |
| GRAND TOTAL | 675,017 | 7,744 | 129,437 | 281,582 | 227,414 | 28,840 |

Source: Bureau of Census.

# Spotting the Air News

## Better Atom Bomb

Recent competent reports that government authorities have increased by about 90 percent the power of the atom bomb that was dropped on Nagasaki, have put responsible authorities, military and civilian, in deep apprehension concerning the future. Appointing commissions to solve the problem will not increase the sum of human wisdom, which seems inadequate to the task. There will be no rest in other countries until they have come abreast of the U. S. in atom development. And when that time comes, there is nothing in sight to stop a renegade national group from dropping atom bombs on whomever they can reach.

With the future of rockets, new types of airplanes, and still more devastating atomic bombs unpredictable, neither the aircraft industry nor the government knows what to do about dispersing plane production facilities. Probably plants above ground will not be safe anywhere.

## Fewer War Planes

Latest estimates of annual military production are lower than the output rate in the early months of 1940. For the rest of this year, not many more than 700; for 1946, around 1200; and in 1947, about 1500. These figures cover both the Army and Navy and exclude commercial production. Output per month in 1940, climbed from 1000 to 2400. All airplanes in action when hostilities ceased are now obsolete. Present plans of the armed forces is to hold the lead in design, by constant research, and experimental production.

Running a close second to Douglas in airline orders is Lockheed, whose shark-like Constellation, four-engined transport developed through war orders, is being sought by at least seven operators. Negotiations under way call for 94 Constellations at a total cost of $75,000,000.

## New Plane Types

The Ryan FR-1 Fireball, with its "composite" power installation, is being held in production by the Navy so as to give it a "volume" test. This airplane is significant as a guinea pig which may produce valuable data for both civil and military aviation. It has a 1200 h.p. Wright Cyclone conventional engine and propeller in front, and a General Electric turbo-jet unit in the rear. It will help to demonstrate whether the greater efficiency of the picon engine at low altitude and low speed, justifies its weight, used with the jet, and it will help to further improve the jet engine, which as yet is nowhere near practical for the high speed military service expected of it. For commercial work its efficiency is still far too low.

Other new airplanes of interest include: The Douglas DC-8, intended to succeed the old DC-3 airline wheelhorse which every air traveler knows. The DC-8 is a pusher, with two counter-rotating co-axial propellers on its tail, powered by two V-type liquid-cooled Allison engines. It has high efficiency and low per-mile operating cost, and will help to demonstrate whether "buried" engine installation and pusher power will work out on transport equipment. Then there is the North American XP-82 fighter which looks something like two of the famous Mustangs put together. Each of its two fuselages carries a pilot. You could start a hot argument whether it's smart to risk two pilots on one airplane and its mission. Glenn Martin appears to be still working on an Army order for two XB-48 six-engined bombers. Consolidated's C-99 200-passenger transport and its military counterpart, the B-36 will fly early next year. North American has built a 4-passenger mockup of a family plane which may be the first entry of a big-time manufacturer (General Motors) into the lightplane field.

## Federal Research Plans

The Senate has begun hearings on proposals before Congress to establish a federal research agency. The hearings are being held by a joint subcommittee composed of members of Senate Military Affairs and Commerce Committees—an innovation in Congress. Before the military committee is the Kilgore-Pepper-Johnson bill for a National Science Foundation, and before the Commerce Committee are bills by Sen. Warren G. Magnusson and Sen. J. William Fulbright for a Bureau of Scientific Research in the Commerce Department. There are others. The President asked for legislation on research in his recent message to Congress.

## British Competition

In view at this time is only one competitor against the U. S. for world aircraft markets: Britain. So far as can be learned the Russians had good airplanes, but it is doubtful if their design, production and sales know-how could put them in the running for a while. The Germans are ruled out, and the French are just out. The aircraft industry is studying an export program which would make more promotional use of air attaches abroad, would promote the development of foreign airports, and get rid of German aviation ideas and equipment still in Latin America. Still further, the industry hopes that the U. S. government will centralize its many authorities over export so that airplane exporters will know where to do business in Washington. At present dozens of federal agencies have strings tied to foreign trade.

*British Combine*

**German Pick-a-back Plane**—This shows the German F.W. 190-J. U. 88 joined together, as used by the Nazis in combat. Frequently the smaller plane on top would be loaded with explosives and launched at targets in midair

# Kaiser-Frazer and Graham-Paige Rent Willow Run; RFC Takes Old G-P Plant

NEW YORK—The Kaiser-Frazer Corporation will occupy 2,650,000 square feet of the Willow Run plant, including the main manufacturing and assembly buildings, the administration building, commissary, power plant, training building and other structures, exclusive of the airplane hangars and landing field. Kaiser-Frazer Corp. may utilize two-thirds of Willow Run's plant space, and Graham-Paige up to one-third.

According to Joseph W. Frazer, president, Graham-Paige will move its facilities from their present location to Willow Run where it will produce its new medium-priced automobile, the Frazer, and its line of tractors, farm implements and the Rototiller. The present Graham-Paige plant on West Warren Avenue, near Detroit, will be leased by the Surplus Property Division of the RFC for display and storage of surplus war production machinery and equipment.

### Joint Activity

Mr. Frazer, who is also president of Kaiser-Frazer Corp., revealed that Graham-Paige and Kaiser-Frazer will set up a joint manufacturing and sales operation. He said that the new company plans to make cars on the West Coast, too, and has been examining prospective sites and facilities there.

Graham-Paige will produce the Frazer car and Kaiser-Frazer will turn out a new car, called the Kaiser. The latter will sell in the low-price field.

The company will be capitalized at $20,000,000. The annual rental for occupancy of the Willow Run plant will be $500,000 for 1946, $850,000 for 1947, and $1,200,000 for the next three years. Rent for the balance of 1945 will be in proportion to the 1946 rental depending upon the amount of space utilized.

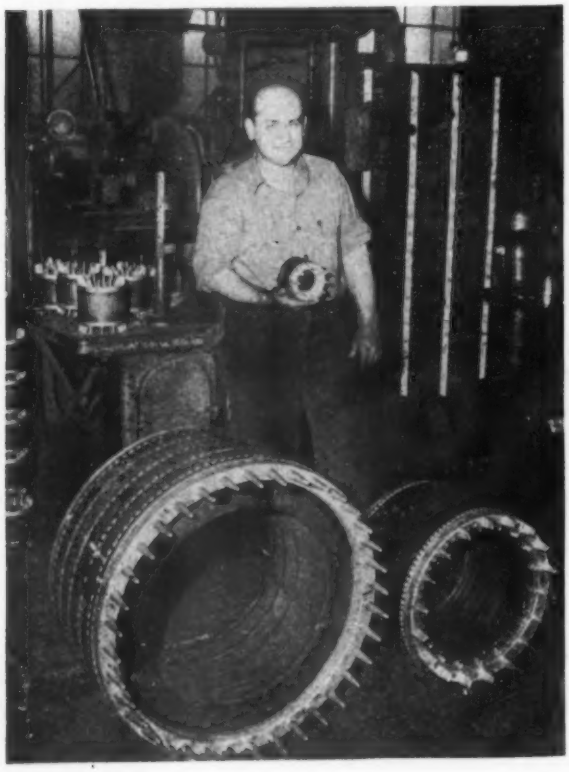
## Reliance Pressure-casts 30" Aluminum Rotor for 250 HP Motor

CLEVELAND — Engineers at Reliance Electric & Engineering Co. have just perfected the pressure casting of what are believed to be the largest aluminum rotors in the world. The engineering accomplishment was achieved while the company was engaged in designing and building some special motors for the tremendous new body presses required by a major automobile manufacturer.

The pressure-casting process makes a one-piece assembly of rotor laminations and cast aluminum windings, providing exceptional ruggedness. Until the special automotive press motors were ordered last spring, however, there had been no attempt to pressure-cast the rotating member of motors of such size, as of 30 in. diameter.

In 1933, when the first aluminum rotors were pressure-cast, it was thought that the ultimate size possible would be 12-in. rotors for AC motors. But a few years later, the company's engineers developed a method of venting pressure-cast units, permitting nearly a 100 percent increase in their size for motors of greater horsepower.

To produce and handle the outsize rotor, a 60-ton casting press had to be enlarged and auxiliary equipment had to be substantially revamped. This was accomplished in 30 days.



**Large Auto Press Rotor**—The new 30-in. aluminum rotor pressure-cast, at left, has been especially developed by Reliance Electric for use in 250 hp. motors for automotive presses. The 20-in. rotor at right had previously been the largest that could be produced by this method, and is used in 200 hp. motors. Development of the new rotor took 30 days, including facilities changes

## Wisconsin Motor to Expand

MUSKEGON—A production increase of 50% is being planned by the Wisconsin Motor Corp., subsidiary of Continental Motors Corp., as soon as enlargement of plant facilities, costing about $500,000 can be completed. Current unfilled orders of the firm are at a record peacetime level in excess of $17,000,000. The new facilities, scheduled for completion in January, should enable the firm to exceed, in the coming fiscal year, sales of any previous year in its history.

## SURPLUS TOOL HUNTERS WASTE DEALER'S TIME

CLEVELAND—The dumping of surplus tools onto the market is causing tool builders and dealers trouble in more ways than one. Here is what happened to an established Cleveland dealer recently:

A small Ohio concern wired the manufacturer of a well-known milling machine in Bridgeport, Conn., for literature and price on one of their most costly milling machines, stating in the wire that they were in the market for five of these machines.

The manufacturer promptly called his Cleveland agent and passed on the "hot" tip. The Cleveland agent, not trusting the telephone, drove some 70 miles for a personal call on this prospective customer.

The "customer's" purchasing agent sheepishly informed the agent that he was the sender of the wire, that his plant superintendent had been offered five of the milling machines from government-owned surplus stock; and that he, being totally ignorant of what such a machine looked like much less what it was supposed to do, thought that by his wire to the builder he would at least know what he was buying should he follow the superintendent's request. He also wanted an idea of what the machine cost when new.

The dealer drove back to his office slowly to allow his temper to cool.

# Names in the News

R. F. Ingram

W. P. Lotz

**R. F. Ingram** has been named to serve as vice president and secretary of the Landis Tool Co., Waynesboro, Pa. **W. P. Lotz,** formerly Eastern sales manager, will succeed Mr. Ingram as general sales manager.

**John S. Hutchins,** formerly executive vice president, has been named president of the Ramapo Ajax division of American Brake Shoe Co.

**Harry P. Barrand** has been elected a vice president and director of the Hanson-Van Winkle-Munning Co., Matawan, N. J.

**Howard F. MacMillin,** formerly president and general manager of the Hydraulic Press Manufacturing Co., has joined the staff of Arthur D. Little, Inc. where he will direct the application to industry of the mechanical engineering and applied physics developments in the Little laboratories.

**Gordon P. Reif** has been appointed vice president for sales of the Metal Specialty Co., Cincinnati, Ohio, while **Guy W. Allis** has been named vice president in charge of the Richmond, Ind. plant and **Joseph Stross** vice president in charge of purchasing.

**Edward de Luca** has recently become associated with the Machine & Tool Designing Co., Philadelphia, Pa. as field representative in the south. He will be located at 1716 Landon St., Jacksonville, Fla.

**Harley W. Whitmore** has recently been appointed chief engineer of the Deepfreeze Div., Motor Products Corp., North Chicago, Ill.

**L. H. Gegenheimer** has returned to the Timken Roller Bearing Co., Canton, Ohio as sales engineer after a four year leave of absence for war duties in Washington where he served with the British Ministry of Supply, War Production Board and as chief of the bearing branch of the Tools Division.

**Robert H. Boyer** has been appointed sales engineer of the Osborn Manufacturing Co., Cleveland, Ohic Mr. Boyer has had 33 years of sales executive experience with various large companies and prior to joining Osborn, he was engaged in the ininspection of precision equipment at the Bullard Company.

**O. M. Hullinger,** formerly with the Line Material Co., has been appointed manager of the Chicago office of the Elastic Stop Nut Corp. of America.

**William T. Kelly, Jr.** has been elected president of the Kellogg Div., American Brake Shoe Co. succeeding **J. F. Weller.** Mr. Kelly has been executive vice president of Kellogg since December, 1944.

W. T. Kelly, Jr.

Harry G. Howell

**Harry G. Howell** has been elected vice president in charge of production of Tube Turns, Inc., Louisville, Ky. Mr. Howell has been associated with General Motors for 22 years and for the past four years has served as head of the Oldsmobile plant.

**W. J. Davidson,** who has been associated with the project since its inception, will be administrative engineer of the General Motors Technical Center, Detroit, Mich. with headquarters at the new center when it is completed. **Col. A. J. Schamehorn** will serve as Davidson's assistant.

**George M. Ryerson,** former field engineer of the Plomb Tool Co., has been appointed regional sales manager for the Michigan, Ohio and Indiana territory. He will make his headquarters at 455 Book Bldg., Detroit, Mich.

**H. A. Leary,** for the past seven years manager of the Chevrolet plant, Muncie, Ind., retired from active business life on October 1, and has been succeeded by **E. J. Bredeson,** formerly assistant plant manager at Muncie.

**William C. Simpson,** who has been associated with the Lukens Steel Co., Coatesville, Pa. since 1934, has been named manager of sales of Lukenweld, Inc.

P. H. Leckie-Ewing

D. J. Sweeney

**Peter H. W. B. Leckie-Ewing** has joined the technical staff of the Union Twist Drill Co., Butterfield Div., Rock Island, Que., Canada as metallurgist and chief of the cutting tools research department. Mr. Leckie-Ewing recently resigned from the War Metals Research Board, Vancouver to join the Union Twist Drill staff.

**D. J. Sweeney** has been appointed engineer in charge of mechanical development of the research and advance development department of the engineering division of the Crosley Corp. For the past ten years, Mr. Sweeney has been associated with the General Electric Co.

**Walter R. Breeler** has succeeded **Charles Spittall,** retired, as general manager of the Allegheny Ludlum Steel Corporation's Dunkirk, N. Y. plant. Mr. Breeler was formerly assistant general manager and has been at the Dunkirk plant since 1926.

**Thomas J. Hilliard,** general manager of sales since 1938, has been recently elected vice president in charge of sales of the Carnegie-Illinois Steel Corp.

**Frank E. Walling** has been appointed president and general manager of the Lewis Foundry & Machine Div., Blaw-Knox Co. Mr. Walling has been associated with the division since 1941, first as assistant to the manager, then as vice president in charge of operations, and lately as acting manager.

**W. E. Stadel** and **M. W. Woodruff** have joined the engineering staff of The George L. Nankervis Co., Detroit, Mich. Both men were recently with the Chrysler Corp., Detroit.

**Porter R. Wray,** since 1943 assistant chief metallurgist of the Duquesne Works, has recently been appointed alloy metallurgical engineer of the Carnegie-Illinois Steel Corp., U. S. Steel subsidiary.

## BUSINESS ITEMS

Oliver E. Nelson

**Olin Industries, Inc.** have formed a new export division to handle the expanded foreign business of all its manufacturing divisions and subsidiaries. A separate enterprise of the corporation, the export division will have its own sales representatives and field staff under the direction of **Oliver E. Nelson.** The new general manager, formerly export manager of the Winchester Repeating Arms Co. division, will maintain his headquarters at Winchester's home office in New Haven, Conn.

**Chandler-Evans Corp** will move all operations of the company to the plant of the parent company, **Niles-Bement-Pond,** at West Hartford, Conn. by the end of the year. There will be no change in the separate identity of the products or company. **Alexander M. Wright** has been appointed assistant general manager of the company, while **Floyd C. Gustafson** has been named sales manager.

F. C. Gustafson

A. M. Wright

**Lepel High Frequency Laboratories, Inc.** has acquired the business, good will and assets of the induction heating division of the **Van Norman Co.,** Springfield, Mass. Van Norman has discontinued the manufacture of induction heating units and in the future all inquiries relating to the sale, service or maintenance of such Van Norman units are to be sent directly to Lepel at 39 West 60 St., New York 23, N. Y.

**The Industrial Oven Engineering Co.,** Cleveland, Ohio, has opened a branch office at 332 South Michigan Ave., Chicago, Ill. **H. W. Munday** and **F. T. Greaves** are in charge.

The **Wilmotte Laboratory, Inc.,** Washington, D. C. recently opened a branch laboratory at 236 West 55 St., New York 19, N. Y. The New York laboratory will be under the supervision of **Paul H. Crago** and will offer complete engineering services in the application of electronics to industrial uses.

The **Carlton Machine Tool Co.,** Cincinnati, Ohio, has joined the **American Machine Tool Export Associates Corp.** as an associate member of the organization. Formed recently to aid Latin American metal working industries, the corporation now includes nine machine tool manufacturers in its group of associate members.

**Stephen J. Benn Industries,** consultant engineers, 401 No. Broad St., Philadelphia, 8, Pa., has been formed by **Stephen J. Benn** to develop post war products. The company will be devoted largely to the development and testing of various products to manufacture for smaller firms unable to carry on new product research.

**The Industrial Hydraulics Corp.** has recently established offices in the Cleveland Trust Bank Bldg., Painesville, Ohio. **W. T. Stephens** is president and chief engineer while **W. B. McClelland** is vice president and sales manager of the company.

**William Sellers & Co.,** Philadelphia, Pa. has formed a new division, the **Hydraulic and Special Machinery Div.,** under the direction of **John C. Graf,** sales manager, and **John B. Cutler,** chief engineer. The division will specialize in hydraulic presses and special equipment for ferrous, non-ferrous, plastic and rubber fields.

**Ampco Metal Co., Inc.,** Milwaukee, Wis. has appointed **N. A. Doolittle,** 1850 East 16 Pl., Tulsa, Okla., as its representative on Okla., southern Kans., and southwestern Mo. **W. W. Swan,** located in the Carondelet Bldg., New Orleans, La., has added a number of counties in southeastern Texas to his present territory of La., Ala., and Miss.

**Continental Can Co.** will soon build one of the largest can making plants in the industry near Weirton, W. Va. on property acquired recently from the **Weirton Steel So.**

**Howard de Franceaux,** recently resigned sales manager of the Rochester Can Co., Rochester, N. Y., has opened an office at 605 14 St. N. W., Washington 5, D. C. where he will operate as a Washington office and service bureau for manufacturers handling such problems as reconversion pricing, contract terminations, renegotiations, together with U. S. Government and foreign government procurement.

The **Sturdy Tool & Gage Co.,** 14520 Shaefer Rd., Detroit 27, Mich. has been formed to produce precision gages, tungsten carbide plugs, rings and built-up gages, including chrome plugs and rings. **Al Robinson,** founder and for 16 years president of the Lincoln Park Tool & Gage Co., Lincoln Park, Mich. heads the new organization.

## OBITUARIES

W. Chichester Sayle

**W. Chichester Sayle,** 58, president of The Cleveland Punch and Shear Works Co., Cleveland, Ohio, and of The Cleveland Crane and Engineering Co., Willoughby, Ohio died unexpectedly at his home Sept. 15. Mr. Sayle was the son of the late Walter D. Sayle and at the death of his father in 1941, he became president of both companies which his father founded 65 and 50 years ago, respectively.

**Franklin T. Woodward,** 63, passed away Sept. 17. Mr. Woodward had served as general patent attorney for Western Electric Co. since 1937 until June of this year when he was appointed consulting patent attorney because of ill health.

**Charles T. Carlson,** 82, founder and vice president of the Republic Stamping & Enameling Co., Canton, Ohio, died Sept. 7 following an illness of two years. Until two years ago, he also served as general superintendent in charge of production.

## MEETINGS

Foundry Equipment Manufacturers Association. Annual Meeting. Hot Springs, Va. Oct. 19-20.

Metal Powder Association. Annual Meeting. Netherland Plaza Hotel, Cincinnati, Ohio. Oct. 16.

# Shop Equipment News

## National Acme Precision Generator Forms Without Radial Distortion

The National Acme Co., Cleveland 8, Ohio, is the producer of a machine designed primarily for the precision thread rolling of Class 3, or closer, fits; where exceptional smoothness, improved tensile strengths and high output are factors of importance. The use of three rolls and a positive and uniform method of camming are design features which suit this machine to rolling threads or other forms on hollow parts, where two rolls, or flat backing rolls, would distort the work.

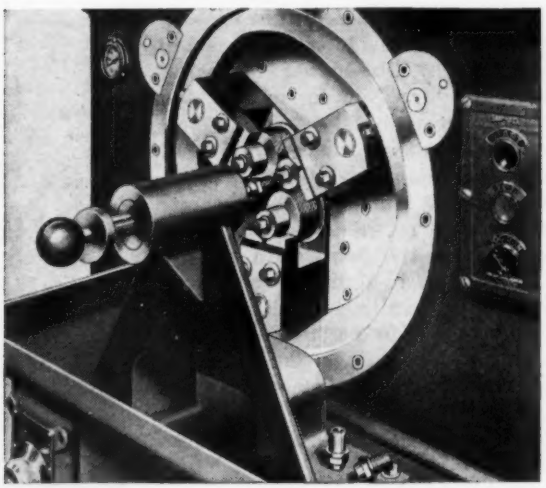
In addition to threading, this machine is suited to production runs with other roll forms, such as first or second operation knurling, burnishing or serrating.

The design is suited to hopper, magazine or hand feed. For a fully automatic set-up, the work is fed from above through an angular magazine, then horizontally inserted between rolls and ejected to slide downward without interference with the loading mechanism. The standard machine, designated as model TR-1, provides interchangeable heads to cover a capacity range from ⅜ to 1 in. dia.

The heart of the machine is the operating head, around the face of which is the solid cam ring supported in the frame housing by three anti-friction bearing rollers. Three roll-guide holders, mounted on the face of the head, contain anti-friction rolls which bear on the inside cammed surface of the ring and are held against the ring by spring plungers. A third set of anti-friction rolls is mounted, outside the threading rolls, on the ends of the work spindles. The outer races of these rolls, which receive the pressure from the guide holders, are stationary; the inner rolls are studded to the spindles.

The work-piece is loaded against a stop between the rolls, and is centered and held by the rolls. The stop can be arranged to eject the work.

The cam ring is oscillated by an hydraulically operated rack engaged with the geared section of the ring, causing the roll guide holders to move the rolls into and out of the work-piece. The length of piston stroke, hence cycle time, is controlled by an adjustable stop and piston reversing action by a Snap-Lock limit switch and solenoid-operated valve. Hydraulic pressure is regulated by a dial on the lower



National Acme precision thread generator provides three tangent points of applied pressure and support for the generation of peripheral deformations. This provides an equalization of forming pressures that permits parts with low resistance to cross-axial compressive stresses to be roll-formed without permanent radial deflection of thin-wall sections

frame and is shown on the gage at the side of the head.

Depth of roll penetration and clearance for different diameters of work is by means of a positive locking micrometer wheel. Each ⅛-in. graduation equals 0.0005-in. adjustment on the work-piece.

The spindles carrying the work rolls are each independently driven through one center gear by a fluid motor which is located inside the upper frame, above the oil reservoir, and is accessible through doors on all sides. Spindle speeds are selective, changed through a dial control on the lower frame.

Two separate oil compartments, in lower frame, are provided with level gages on the front panels—one for hydraulic oil and one for lubricating oil.

For manual work feeding, the machine is equipped with a hand loader and foot-pedal—which are standand equipment. For continuous automatic operation, with a magazine loader, cycle control is by an electric timer located in the control box.

The main motor, driving the hydraulic pump, is controlled by Snap-Lock pushbutton switch located at right of head. Other electrical controls—transformers, solenoid, cycle timer and safety fuses—are in one box away from oil contamination and in accessible positions to permit ease in servicing.

## Skid-Rol Wheeled Dollies Make Machinery Moving Safer

Techtmann Industries, Inc., 828 North Broadway, Milwaukee, Wis., announce the development of Skid-Rol dollies. Obtainable in pairs, Skid-Rols are simple dollies for shifting machines, tanks, boxes, steel blocks, dies, furnaces and heavy objects; loads from 10 to 12 tons. Steel cleats imbed into the wood skids and carry the load, only a few inches from the floor, with greater safety and ease, eliminating hazards involved in handling wooden rollers; accidents due to passing and positioning rollers are avoided. Load can be rolled from place to place over all types of hard floors or pavements—also rolled diagonally across railroad tracks—plus acting as a turntable, if desired.

Each dolly is 18½x10½x4 in. high, equipped with four all-steel rollers 3¾ in. dia. Roller bearings are lubricated through Zerk fittings. If inverted, Skid-Rols can be used as a standing dolly for moving steel beams, or girders, or can be fastened to beds for handling plate.

# Millholland Indexing Machine Permits Interchanging Tool Heads

The W. K. Millholland Machinery Co., 1048 Fairfield Ave., Indianapolis 5, Ind., produces the 15A automatic indexing machine for high production drilling, reaming, milling, spot facing and tapping operations. One or more pieces are loaded into the fixtures at each station, depending on the size of work and operations required. The indexing table is 18 to 20 in. dia. and can be arranged to index 6, 8, or 12 positions and can be indexed up to 720 times per hour.

Multiple heads with 4, 6, 8, 10 and 12 or more spindles can be mounted on the vertical master power units and sideheads can be mounted on each side of the vertical master unit and equipped with multiple spindles for different operations. Parts can be drilled, reamed, faced and milled or tapped, progressively, in two planes.

The vertical unit is the master unit and controls positive timing of all operations as to feed and indexing. The vertical master unit can be equipped with motors up to 10 hp. and side unit up to 3 hp.

The feed is sensitive enough to drill ⅛ in. holes in steel and powerful enough for ⅞ and 1 in. holes in steel, boring up to 2½ in., facing up to 3 in. for multiple operations.

Tool-spindle speeds ranging from 100 to 2500 r.p.m. can be used with maximum stroke up to 6 in. length on vertical and 5 in. on horizontal.

The indexing table is mounted on a large diameter ball thrust bearing and is provided with ample bearing for side thrust. Overload protection is provided through overload safety clutch which prevents damage to the machine through breaking or sticking of tools.

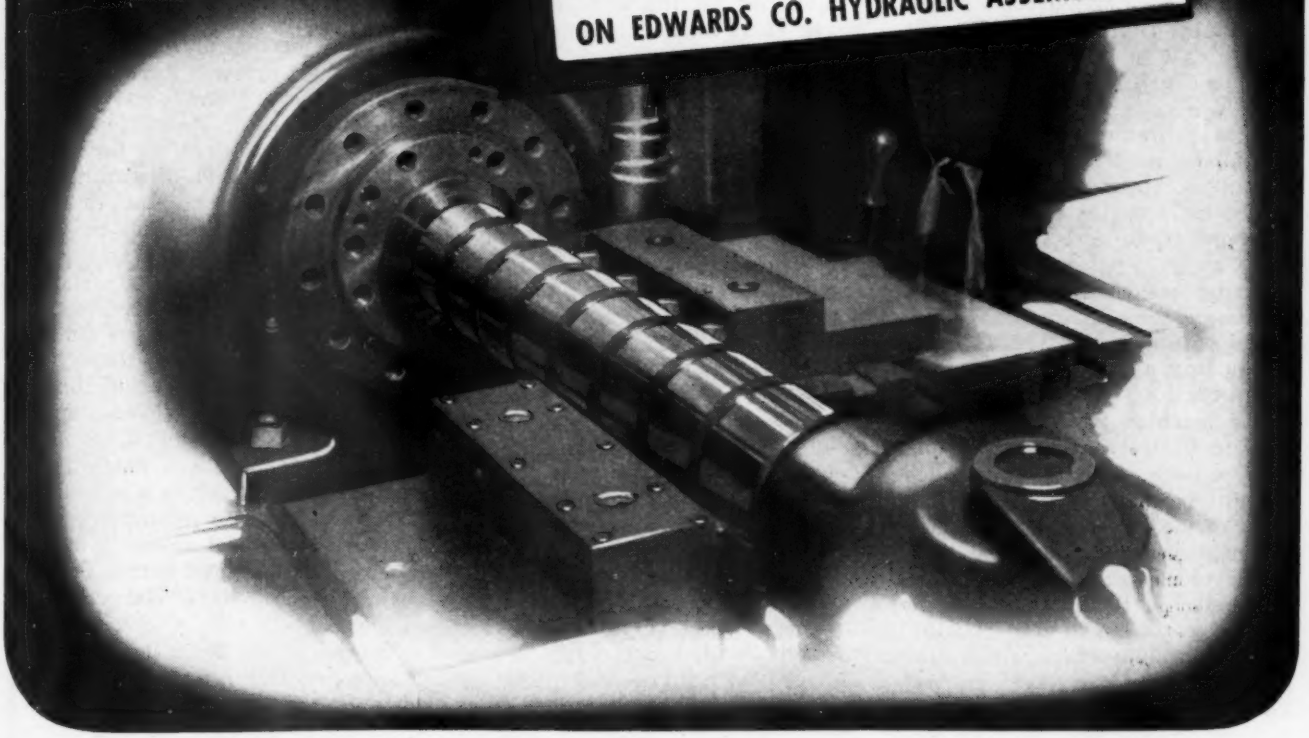
The operator is not required to put his hands near any revolving tools and loading and unloading is done at a point where fixtures are away from revolving tools and with minimum risk to operator involved. Fixtures are made with channels for leading chips into the chip pan.

By providing suitable spindleheads and index table arrangements, high speed production of small amounts of stock items are made possible with a minimum of time allotted to changing machine set-ups.

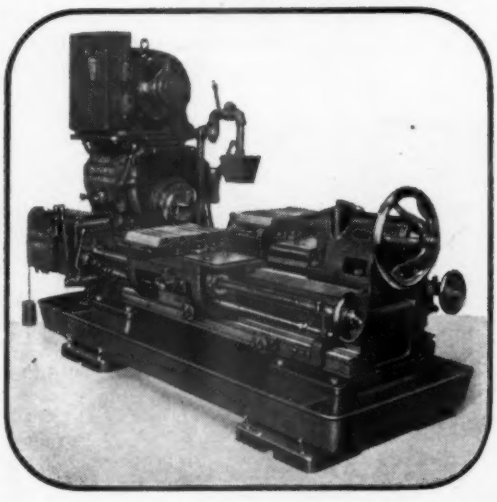
**Millholland indexing machine has provision for interchanging spindles and fixtures to adapt operations to requirements of dissimilar products**

# LODGE & SHIPLEY LATHES at work

## INCREASING PRODUCTION .. 138%
## CUTTING OPERATING TIME 58%
### ON EDWARDS CO. HYDRAULIC ASSEMBLIES



## Do it with a DUOMATIC



One of the amazing stories typical of the Duomatic's accomplishments is recorded on the production sheets of the Edwards Co., Division of Rogers Diesel and Aircraft Corporation, Sanford, N. C.

The Duomatic—Lodge & Shipley's full automatic lathe—is shown above machining aluminum alloy 24 ST. tubing, the main cylinder for a wing fold strut hydraulic assembly.

Formerly, 8.9 pieces per hour were produced, requiring 6.72 minutes per piece. With the Duomatic, *21.2 pieces are now produced in an hour, requiring only 2.82 minutes per piece.* A 138% gain in production,—58% decrease in operating time!

Dual tool slides and carriages, operated singly or together, make the Duomatic like *two* lathes in *one*. Just one of the many features of this lathe which make possible far greater and better production at lower cost. Call on L & S Engineers for a complete demonstration on your work. For further details on the Duomatic, write on your Company letterhead for Bulletin 601.

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L & S LATHES

# Pratt & Whitney Gear Grinder Uses Change Gears for Generation

A universal hydraulic vertical gear grinder, for both spur and helical gears, has been announced by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn. The machine is capable of handling gears up to a maximum outside diameter of 30 in., with a maximum diametrical pitch of 2 and a minimum diametrical pitch of 12. It will handle helix angles, either right- or left-hand, up to 35 deg., and a maximum width of gear face of 10 in. Indexing means are provided for grinding gears with numbers of teeth ranging from 5 to 190 inclusive, except for a few prime numbers above 83.

The machine is similar in principle to the 10 in. Pratt & Whitney gear grinder in that both produce involute profiles by rolling the pitch circle of the gear being ground upon an imaginary pitch line. The rolling of the pitch circle is in a direction perpendicular to the gear axis, and with a gear tooth in contact with a V form grinding wheel, which simulates one tooth of a generating rack. The grinding wheel is mounted on a ram, or wheel slide, which reciprocates in a direction parallel to the gear axis.

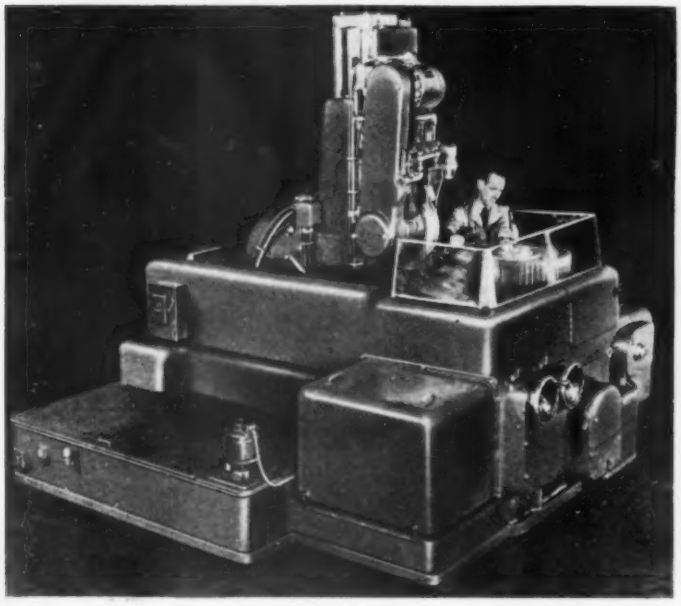
Differing from the horizontal 10 in. machine, the 26 in. gear grinder is a vertical machine whose motion most nearly resembles a vertical shaper. It has a vertical work axis, and a vertically moving wheel slide. This arrangement is more convenient for placing large diameter, heavy gears in the machine.

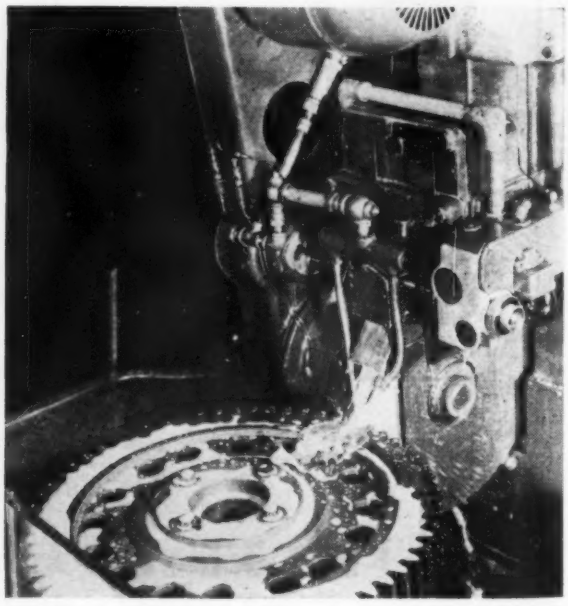
The greatest difference between the standard 10 in. grinder and the 26 in. gear grinder, is in the mechanism used for producing the rolling generating motion of the gear being ground. Instead of the master rack and master gear method, the machine uses a system of change gears. The work is mounted on a rotary table and rotated by a worm and wheel. This rotary table is supported on a carriage which is moved, in a direction perpendicular to the work axis, by means of a screw. The relative rates of motion, of the rotary table and the sliding carriage, determine the rolling or generating pitch diameter of the work. Change gears connect the pitch screw to the table worm. The change gear ratio can be altered to cover the range of pitches, pitch diameters and tooth numbers. Indexing is obtained through a one-tooth clutch in the change gear train driving the rotary table. During the return of the carriage, this clutch withdraws and rotates one or more turns, which alters the rotative position of the work. A telltale lamp indicates the operation of this one-tooth clutch.

The vertical ram carries the wheel spindle and wheel drive motor, and a motor driven wheel dressing device. The ram is vertically reciprocated, and its motion is regulated automatically by three adjustable dogs. The entire ram guide ways are on a swivel head which can be adjusted to guide the ram in a true vertical motion for spur gears, or at any angle up to 35 deg. right-hand or left-hand for helical gears.

The wheel dressing device is of a special design and uses three diamonds, one for each side of the V form wheel and one for the outer diameter. The side diamonds are mounted on a parallelogram linkage in such a manner that they may be guided in a straight path for pure involute teeth or on a partially curved path for tip relieved or modified teech. These side bars are guided by a form of the desired shape and may be set for any pressure angle from 13 to 30 deg. The center diamond can be guided to dress a flat across the V profile, a flat with a radius at each corner, or a semicircle or elliptical profile joining the two V sides. The wheel dresser is motor driven and automatic during operation, but is started and stopped manually.

In general, the 26 in. gear grinder is a large and heavy machine to maintain the accuracy it is required to produce. It ocupies a floor space 107 × 135 in. and weighs approximately 20,000 lb. Because of its size, duplicate handwheel controls are provided: one for the front and one at the side of the machine for greater operator's convenience. A cabinet is provided at the rear which





Pratt & Whitney 26 in. gear grinder generates the tooth profile by a rolling motion of the theoretical pitch circle on the theoretical pitch line, while a vertical movement of the grinding wheel tangent generates the form over the full face of the gear

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houses the motor and pump mechanism for the hydraulic system, as well as various control relays. A large coolant tank, with individually motor-driven coolant pump is located at the side of the machine. Over 40 places, which include all major operating slides and bearings, are lubricated from a built-in automatic pump. Lucite guards enclose the coolant spray during grinding, yet permit full work vision.

Various methods of work mounting can be arranged according to the nature of the gear being ground. For example, the gear may be placed on an arbor mounted on a center in the table and an upper center in the tailstock. The gear also may be clamped to a fixture on the rotary table with or without a tailstock. There is a 6⅛-in. dia. hole through the rotary table which permits holding pinion gears with integral shanks. If these shanks are longer than 3 ft., the bed of the machine may be left open at the bottom and a hole cut into the floor, or provision made in the foundation.

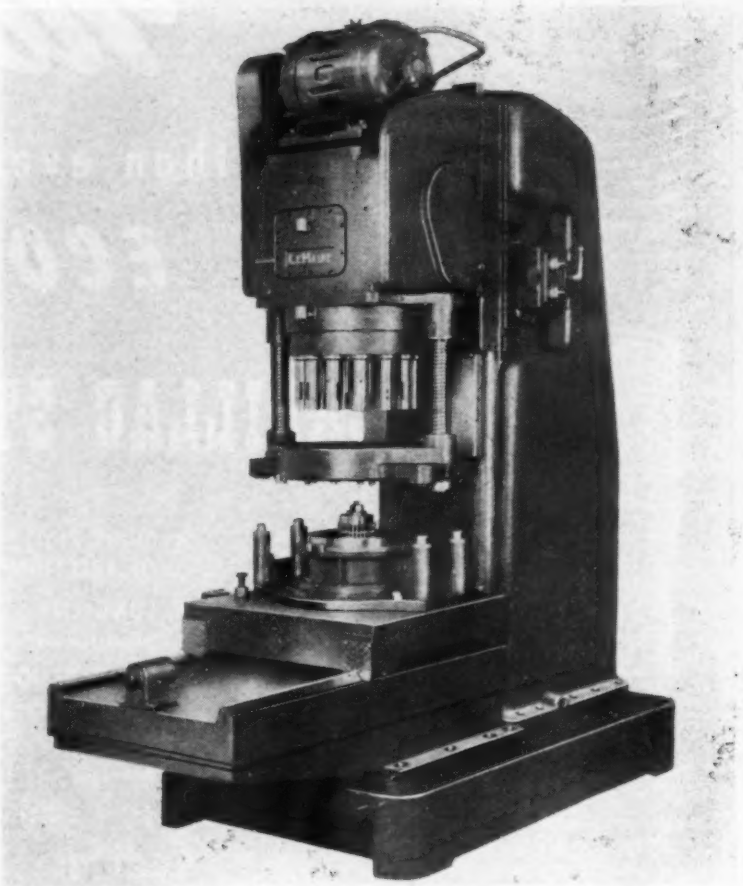
## JO Adjustable Torque Wrench Provides Positive Release

The JO Manufacturing Co., South Gate, Calif., is the manufacturer of both T- and L-handle torque wrenches for use in assembling close parts. A ratchet mechanism is included in the construction of the T-handle wrench that provides a torque range of 5 to 40 in. lb. Torque settings can be reset, at any time, with tools available in any toolroom.

L-handle wrenches have the same torque range and are available with or without the ratchet mechanism.

Jotee and Joel wrenches are made of aluminum and are light and small to fit into confined spaces

# LeMaire Vertical Drilling Machine Uses Hydraulically Actuated Feed



Gears and bearings in the driving head of the LeMaire Model 20 drilling machine are lubricated through a splash system. The sliding surfaces on the head are greased by Alemite system. Automatic lubrication is optional

Another standard machine has been added to the line of vertical drilling machines made by LeMaire Tool & Mfg. Co., Dearborn, Mich. It was designed and built for accurate single or multiple spindle drilling and boring of extra heavy parts; and is identified as Model No. 20.

The machine is furnished with a spindle having a milled drive slot for multiple-head adaptation. Provision is made for a Morse-taper adapter for single-spindle operations.

The movement of the head for rapid advance and feed is actuated by means of a heavy-duty hydraulic cylinder mounted to the column between the ways, controlled by Vickers control panel. The machine is equipped with fourteen spindles set to drill eight holes 17/32 in. diameter and six holes 39/64 in. diameter. Then, while the part is still in the fixture, six drills are replaced by six reamers to ream the holes to 0.6245 in. Magic Quick-change chucks are used.

By being able to perform three operations without disturbing the original setup a user can save considerable time and thus increase production. A manually operated shuttle-type fixture is provided to facilitate the loading and the removal of parts with a hoist. A rigid box-type table 25 × 29 in. maximum is standard equipment. An index table 42 in. dia. maximum for either manual or automatic operation can be had at extra cost.

Power is transmitted by V-belts to a pick-off gear shaft, and through pick-off gears to worm and worm wheel, which drives the spindle.

Spindle is mounted in double row ball bearing at the upper end and in a double row Timken roller bearing at the lower end to eliminate lateral displacement and avoid any possibility of bearing vibration.

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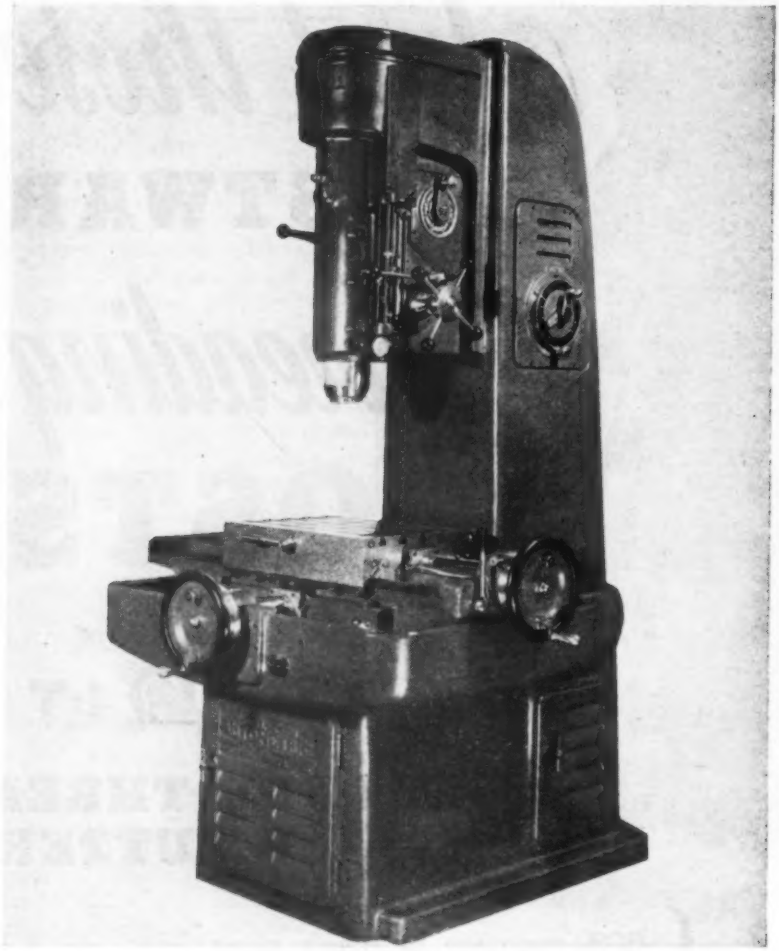
# Autometric Boring Machine Control Facilitates Precision Layouts



The load of the measuring screws of the Autometric boring machine is accurate to within 0.0001 in. in any one inch and 0.0002 in within any 12 inches. All alignments affecting the accuracy of the workpiece are held to within a non-accumulative error of 0.0002 in. in any 12 inches.

The Kearney & Trecker Products Corp., Milwaukee, Minn., has announced a model C Autometric boring machine. This machine was developed to handle a variety of precision boring from toolroom work to precision production jobs.

Bed, column, and chip guard are cast in one unit. A stationary boring spindle head is mounted on the machine column, thereby providing a long bearing for the spindle quill. The construction of the head, spindle, and quill permit sufficient quill travel to take care of the entire vertical range of the machine without increasing the over-all machine height. This feature reduces the number of sliding members. Coupled with a single lever directional control, to quill feeds and power rapid traverse movements, this reduces setup and operating time. Accurate means are provided for gaging depth of quill movement to as many as four positions. A weight inside the column counterbalances the quill. The spindle has a No. 40 National Standard taper and a quick change nut for convenience in changing tools.

A 1-hp. motor mounted in the base drives the spindle. Power transmission is quiet and vibrationless with direct multiple V-belt drive to the spindle at all speeds. The rapid traverse mechanism to the quill is powered by a ¼-hp. motor which operates only while the quill is being rapid traversed.

The table and saddle slide on hardened steel, inverted V-ways. The weight of the sliding members holds them in alignment at all times with a minimum of friction, no gibs are required. Equalizing clamps lock the sliding members without distortion.

The transverse and longitudinal movements of the table are effected by precision measuring screws equipped with large diameter micrometer dials and verniers graduated to read to 0.0001 in. Mechanical counters are set at zero during the initial setup, giving the table position in inches and tenths of an inch. The 5-pitch measuring screws move the table 0.20 in. per revolution. Since the micrometer dial graduations are numbered from 0 to 100 on each half of the periphery, their operation is as simple as though 10-pitch screws were used.

An efficient lubricating system is provided with metered circulating oil to most running parts.

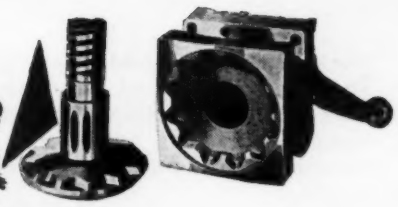
## Interchangeable Coil Inserts Increases Thermonic Facility

The Induction Heating Corp., 389 Lafayette St., New York, N. Y., has developed a master coil with removable inserts which eliminates coil changing in setting up Thermonic equipment for induction heating applications. These inserts can be changed in a matter of seconds and are available in sets which will accommodate diameters ranging from ⅛ to 3 in.

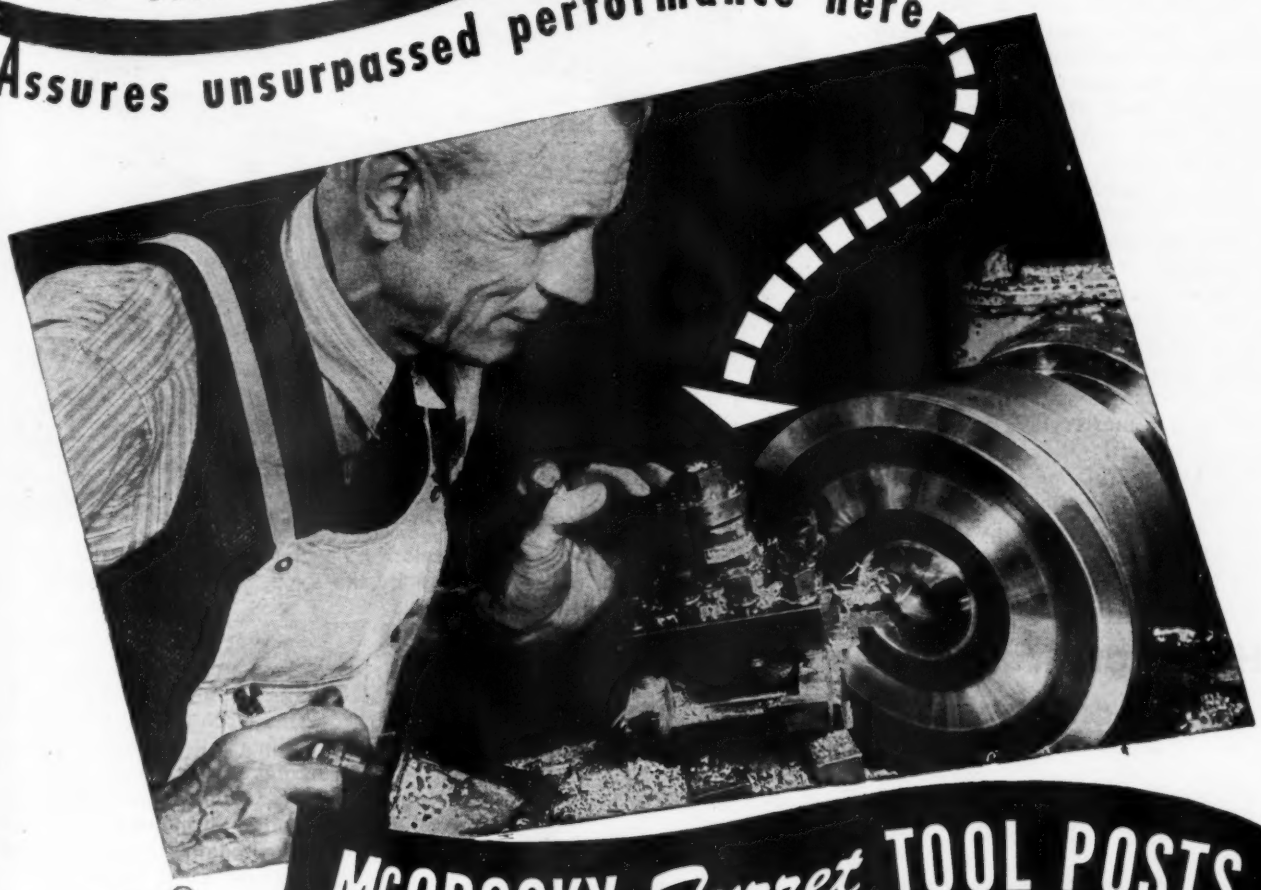
The basic master coil consists of a water-cooled inductor block, machined to take inserts which go to make up the actual coil. This gives, in effect, a single-turn inductor

**AUTOMETRIC SPECIFICATIONS**

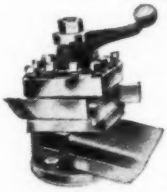
| | |
|---|---|
| Table working surface | 14 x 22½ in. |
| Transverse table travel | 12 in. |
| Longitudinal table travel | 18 in. |
| Table top to spindle nose | 17 in. |
| Vertical quill travel | 11 in. |
| Spindle speeds (infinitely variable) | 50 r.p.m. to 2,500 r.p.m. |
| Eight quill feeds | 0.005 in. to 0.0148 in. |



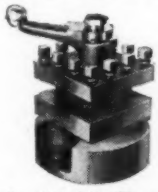
This time-proved construction here
Assures unsurpassed performance here



McCROSKY *Turret* TOOL POSTS



*Style "O" Turrets Mount in the T-slot.*



*Style "OL" Turrets Mount on the Bolt Circle of the Main Slide.*

● Featuring a service-proved design conceived, perfected and available only from McCrosky, these tool posts give engine lathes the versatility of turret lathes. The indexing corrugations on the post and body, with their long shore line of contact, are finished to extremely close tolerance on specially built machines. This construction provides the extreme rigidity needed to withstand the thrust of the cut—minimizes wear—and assures easy, extremely accurate indexing of successive tools into cutting position, without stopping for tool changes.

McCrosky Turrets are used by leading concerns from coast to coast. Endorsed by all well known lathe manufacturers. Furnished in five styles including square and hexagon designs. Nine different sizes. Write for catalog.

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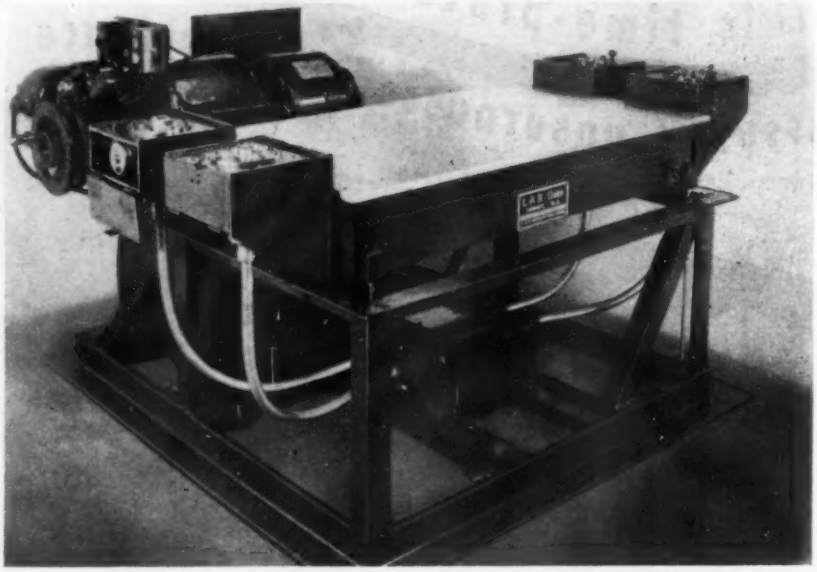
*Wizard* CHUCKS AND COLLETS
*Super Adjustable* REAMERS
*Turret* TOOL POSTS

block of variable inside diameters. The inserts can be of any desired thickness, thus making the coils capable of heating axial bands of various width to produce many heat patterns.

The insert is held in place by screws and obtains its cooling by thermal conduction from the master coil. The inserts may be used in multiples, thus offering the flexibility of many different coils of unusual contour.

The standard Thermonic master coil set, consists of two master coils and forty-eight inserts contained in a specially constructed access. The smaller master coil, with twenty-seven inserts, accommodates round stock ranging from ⅛ to 1¼ in. and these inserts are of three thicknesses for each diameter; ⅛, ¼ and ½ in. The larger master coil, with twenty-one inserts, takes stock ranging from 1½ to 3 in. and the inserts are in the same thicknesses. Blank inserts are available to allow the user to cut the desired contour to match the particular work.

## L.A.B. Vibration Test Table Has Automatic Frequency Control



When viewed with a stroboscope, relative vibratory displacements of parts can be observed while under test by the L.A.B. vibration test table

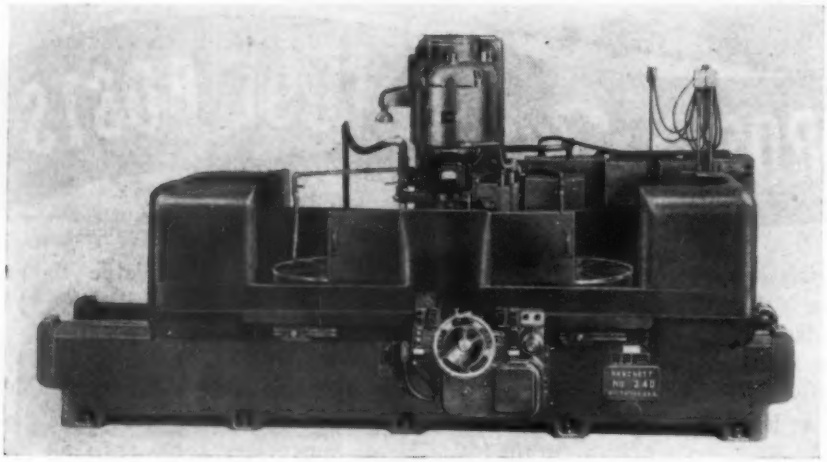
A reaction type vibration test table, used to test assemblies and components, is announced by L.A.B. Corp., Summit, N. J. The large table top is supported by four vertical rods, acting as flexing columns, to permit free table vibration in the two horizontal directions. Four sets of rotating eccentric weights induce rectilinear and pure harmonic vibrations. These weights, mounted on vertical shafts, are driven by a variable speed drive through a synchronizing gear box and flexible shafts.

The amplitude (⅛ in. max. excursion at 100 lb. table load) and the direction of vibration are adjustable when the machine is not running. Increase in load over 100 lb. reduces the amplitude.

Standard frequency range is 10 to 60 cycles per second, which is adjustable, while running, either by hand wheel or ¼ hp. motor-driven automatic frequency change control, with one minute complete cycle. Amplitude does not vary with frequency. An acceleration of 10 Gs is produced between 50 and 60 cycles per sec. at ⅛ in. double amplitude.

The equipment, which has a maximum capacity of 400 lb., weighs 1500 lb. and is operated by a 5 hp. motor. It utilizes small space, overall dimensions being 52 × 58 × 32 in. high. Table top is 24 × 40¾ in. Installations can be made on upper floors of buildings without concrete bases.

## Hanchett Rotary Surface Grinder Decreases Production Set-Up Time



Individual controls for the Hanchett duplex rotary surface grinder permit one table to be set up for grinding while the other is operating

The Hanchett No. 24 duplex rotary surface grinder is equipped with two rotary or magnetic chucks. Two direct current motors attached to the under side of the carriage drive the rotation of each magnetic chuck at variable speeds through remote electronic controls. The push-button controls are centralized.

A 25 hp., 900 r.p.m. motor is used to run the grinding wheel. Unusually fine finishes are obtained with the segmental type grinding wheel, because of more accurate machine construction and improvements in segmental wheels. Other equipment includes two 30 in. magnetic chucks, 18 in. segmental wheel chuck fitted with set of grinding segments, all small motors and controls for head feed and carriage traverse, two drum type demagnetizing switches, ammeter for wheel motor, flood light, wheel dresser, wet grinding system including two motor driven coolant pumps and tanks.

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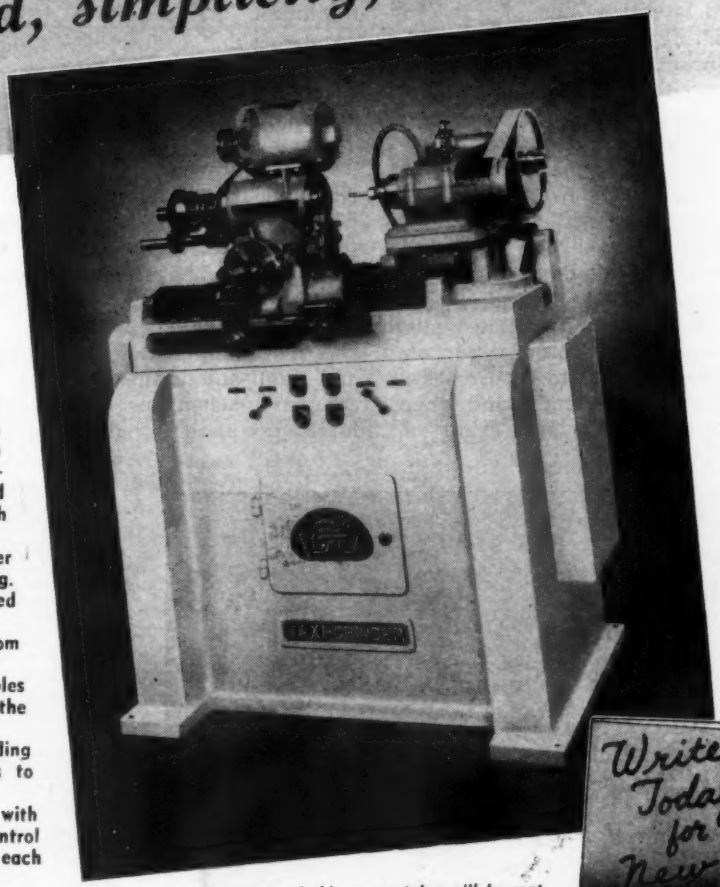
AMAZINGLY ACCURATE!

# New Maxi-GRINDER features Unusual Design . . . Developments offer combined speed, simplicity, wide range



These features make the Maxi-Grinder outstanding as a fast, precision internal grinder:

Grouping of operating controls is such that operator's right hand is free to load and unload work.

Closing and opening of collet is entirely automatic . . . operated with a cam and lever arrangement.

A motor driven mechanical differential unit drives the ram in which the grinding spindle is mounted . . . positively eliminates bell-mouth holes. Length of stroke is easily adjusted, making it adaptable to grind shoulder and blind holes; has six speeds, can quickly be slowed with speed control switch for wheel dressing.

Diamond wheel dresser has a micrometer feed, quickly adjusted for automatic hole sizing.

Hardened, ground and lapped ways are sealed against dust.

Feeding mechanism is absolutely free from backlash and is totally enclosed.

Setting up to grind taper and angular holes is simplified by use of a built-in sine bar on the work head (see above close-up).

Dust collecting system draws off all grinding dust, prevents clogging, glazing and adds to wheel life.

All functions are performed mechanically with electric motor power and push button control . . . a separate motor being used for each operation.

*Your copy of this new catalog will be sent immediately on request. Write . . . get acquainted with this newer, better method of internal grinding.*

**Wilson Machine Products**

**1231 BEAUFAIT AVE.**
**DETROIT 7, MICHIGAN**

### Alumox Protects Aluminum Without Electrolytic Process

Enthone Co., 442 Elm Street, New Haven, Conn., has developed a process called Alumox, for chemically treating aluminum and aluminum alloys, that produces a corrosion-inhibiting coating to protect against corrosive atmospheres, such as salt spray.

The process is stated to be suitable for non-copper bearing aluminum alloys. On such alloys, coatings can be obtained with a standard salt-spray resistance of 250 hours.

The treatment requires no electric current and consists of immersion of the aluminum in a dilute solution of Alumox salts operated near 210 F. for 2 to 15 min. The finish obtained is grayish-green.

## Sheffield Diamond Wheel Dressers Convert Wheels to Multi-Rib Type

The Sheffield semi-automatic diamond dresser, manufactured by the Sheffield Corp., Dayton, Ohio, is mounted between centers of the grinder and is actuated by the driving pin on the face plate. A precision ground cam for the required pitch is mounted upon an accurately ground and lapped spindle and controls the movement of a diamond. The reciprocating movement of the diamond in conjunction with the uniform lateral motion imparted by the leadscrew results in the desired wheel-profiling action which is transmitted to the grinding wheel.

This precision dressing device is recommended for use on work demanding long lengths of thread and where the breakdown of a single point wheel necessitates making a number of passes; thread gage grinding for elimination of thick first and last threads; maintenance of minimum lead variation; fine pitch threads over 32 threads per in.; where the wheel is to be dressed at the required helix angle; and where it is desired to traverse grind and the sharp corner and small radii exceed the limits of crush dressing methods of wheel-forming.

This Dresser makes possible the use of a multi-form wheel on single point thread grinders having sufficient table space to permit its installation. At least 2½ in. clearance is required below the centers and 5¼ in. is needed back of the centers measured on the table. Center to center requirements are 4¾ in. minimum.

### Easy Reciprocating Sander Has Interchangeable Pads

The Detroit Surfacing Machine Co., 7433 W. Davison, Detroit 4, Mich., announces models XL50 and XL90 Easy reciprocating sanders. The sanders are equipped with a floating pistol-grip type handle, a more powerful motor, perfected balancing and a slide type switch mounted on the handle.

In both models, the straightline, reciprocating action that mechanically duplicates the back-and-forth motion of hand block sanding, rubbing, or polishing is retained. The short, rapid stroke develops little heat.

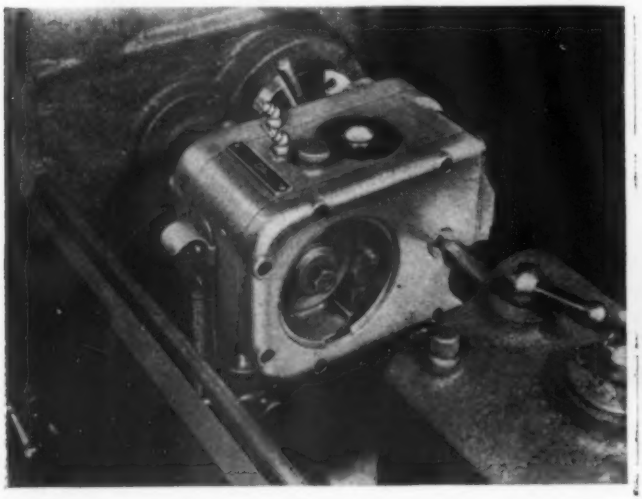
Detachable sanding pads are a feature of the model XL90. A snap-action device permits attachment of the correct type of pad for the job. To insure maximum efficiency on flat, curved, wet or dry work, pads are furnished of felt, rubber, and other materials of desired shape, size, and degree of flexibility to suit conditions that require unusual combinations of pads.

## Red Ring Internal Gear Shaver Reduces Changeover Setup Time

National Broach and Machine Co., 5600 St. Jean, Detroit 13, Mich., is the manufacturer of a Red Ring internal gear shaver which operates on the crossed-axes gear shaving principle.

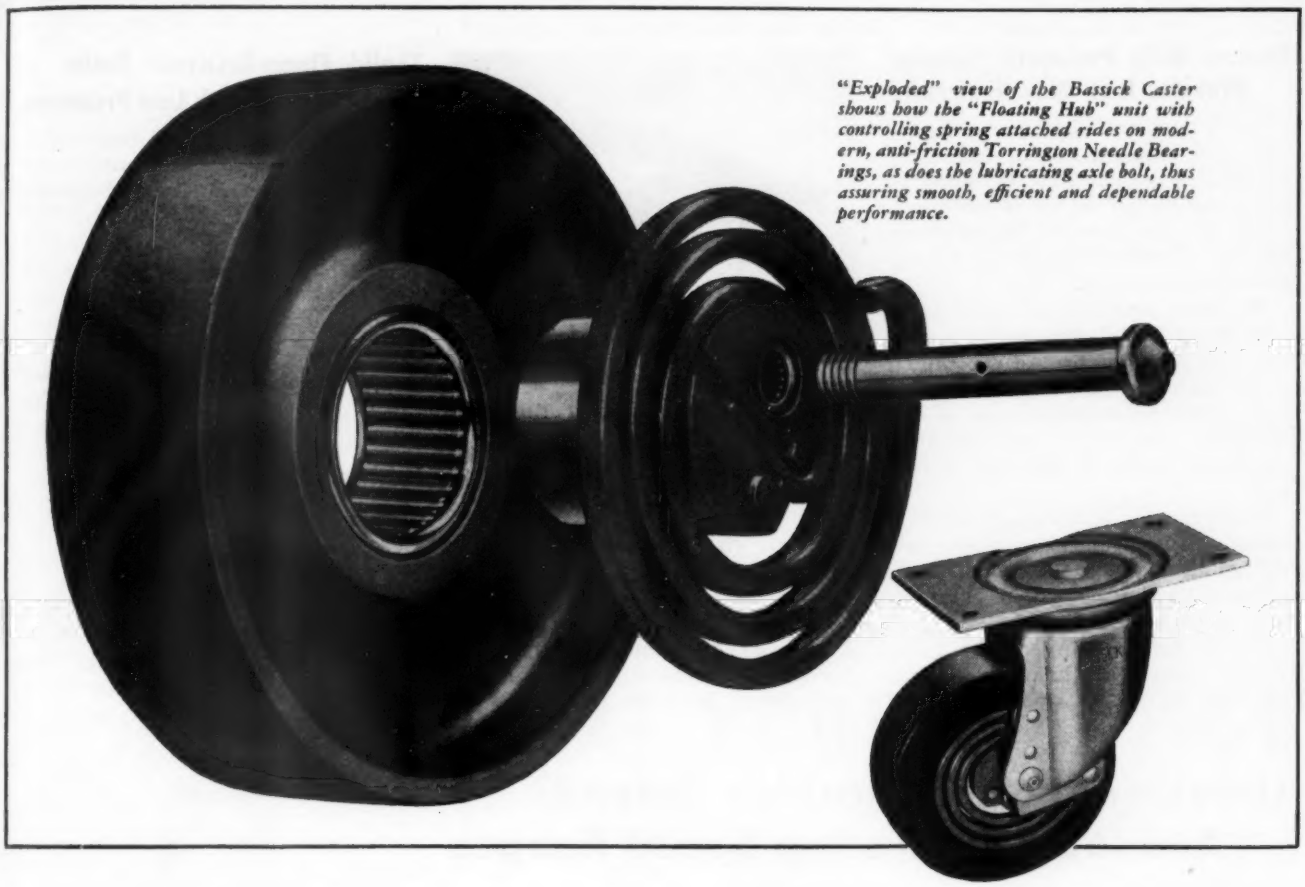
A fast, simplified loading process and semi-automatic clamping and ejection mechanisms make possible high production with unskilled labor. Floor-to-floor time is, 70 sec. on a 6 in. dia. by 1 in. face gear. Rigidity of the machine permits high feeds and speeds.

Change of setup can be made in 15 to 30 min. Other features are easily set automatic feeds and power traverse of the cutter head slide to completely clear the work spindle for loading and unloading.



Single-point thread grinders can be converted to the multi-ribbed type when formed with the Sheffield semi-automatic diamond wheel dresser

Red Ring internal gear shaver set-ups can be changed to different arrangements in a short time due to the accessibility of control arrangements



*"Exploded" view of the Bassick Caster shows how the "Floating Hub" unit with controlling spring attached rides on modern, anti-friction Torrington Needle Bearings, as does the lubricating axle bolt, thus assuring smooth, efficient and dependable performance.*

# Needle Bearings Help Make a Rough Ride Smooth

Protection from shock and vibration is of prime importance in equipment such as engine parts trucks, food and dish trucks or portable control panels containing delicate tubes and instruments. When Bassick "Floating Hub" Casters, used on equipment of this type, hit an obstacle they ride over the bump without lifting the load. These ingenious, smooth-running casters are equipped with modern, *anti-friction* Torrington Needle Bearings, which assure easy, efficient performance in the moving of heavy and delicate loads over rough surfaces.

Built for long life, these sturdy, compact bearings can stand up to the countless sudden shocks to which they are subjected in equipment such as the casters described above and provide efficient *anti-friction* operation. Furthermore, the simple, unit construction of Torrington Needle Bearings makes for ease of installation and lubrication.

Perhaps *your* design or production problems could be simplified if you were better acquainted with the many advantages Needle Bearings have to offer, including high load capacity, small size, *anti-friction* operation—and low cost. Our Catalog 32, which contains a world of engineering data, will help you choose the size and type Needle Bearing best suited to meet your particular requirements. We'll be glad to send your copy upon request.

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## TORRINGTON NEEDLE BEARINGS

## Bantam Bully Pneumatic Hammer Provides High Blow Frequency

A small pneumatic hammer, delivering 1,300 blows per min. and operating on less than 2 cu. ft. of air at 80 to 100 lb. per sq. in. is manufactured by the Superior Manufacturing Co., Public Square Building, Cleveland 13, Ohio.

Weighing less than 2 lb., the hammer has a pistol-grip handle, of a dimpled aluminum casting, which gives the operator comfortable control of the rapid-firing power of the hammer. The valve control, in trigger position, adds to the ease of control.

Tools for the hammer, of which a wide variety are available, are loaded in a quick-acting ball-and-channel locking chuck. A quarter-turn of the knurled nose of the chuck locks or releases any of the tools. The Bantam Bully hammer has but one moving part, the piston striking member, which is precision-fitted in a ground cylinder. Travel of the hammer piston is approximately ⅜ in. and normally operates between 1,200 and 1,400 blows per min., depending upon the trigger regulation and the air pressure available.

Stroke frequency of the Bantam Bully hammer can be adjusted by an air-volume valve, to suit specific applications

## Thalid Flame-Resistant Resin Hot-Forms with Low Pressures

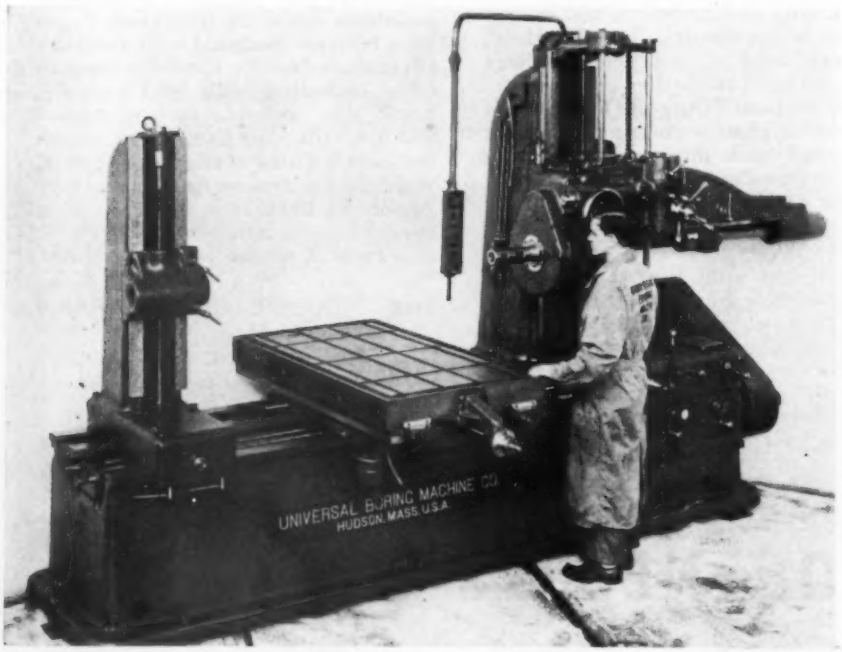
A flame resistant Thalid impression molding resin has been announced by the Plastics Div. of Monsanto Chemical Co., St. Louis 4, Mo. The material is an impression molding resin that provides plastics-glass cloth laminates which are self-extinguishing and do not support combustion.

The resin is designated as Thalid XR540. It is handled the same way as previous impression molding resins. The filler of cloth, paper or other sheets is saturated with liquid resin. Either before or after this operation it is draped on molds on forms. The application of heat then transforms the combination into a hard, tough structure of light weight and high strength. Only sufficient pressure is necessary, during this operation, to hold the material in place.

## Universal Boring Machine Extends Available Operating Speed Ranges

The horizontal boring machine manufactured by the Universal Machine Co., Hudson, Mass., has been redesigned and improved to provide increased accuracy and productivity. Some of these include higher speed ranges and an increase in the number of speeds. The increase in horsepower has also necessitated changes in gearing—they have been proportionately increased to compensate for higher speed.

Pendant type control increases ease of operation, as the operator can work controls from any position around the machine.




Controls of the Universal boring machine have been relocated and higher speed ranges provided. The addition of a pendant control station permits operation from any position within range of the pendant arm

The Marton sequence valve controls application of pneumatic pressure by means of a pressure-sensitive by-pass mechanism

## Marton Sequential Valves Simplify Pneumatic Actuation

Marton Equipment, Inc., 145 Cabot Street, Beverly, Mass., announces the addition of a quick action sequence valve to its line of air equipment.

The Marton sequence valve S137 enables two or more cylinders to be operated in their correct sequence by one control valve. The valve remains shut until the air pressure in the first operating cylinder is built up to a preset pressure. When this pressure is reached the valve opens and allows the next cylinder to operate. A built-in check valve allows free passage of exhaust air.

One application of this valve is

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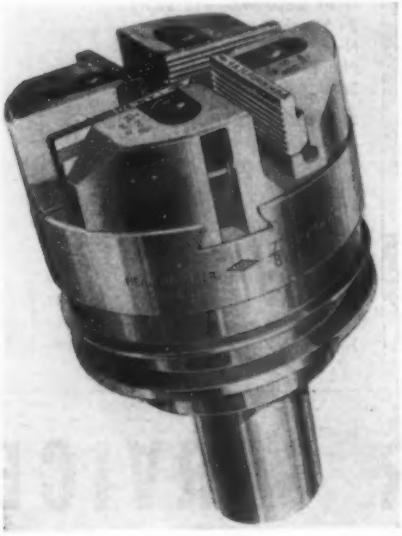
to a lathe having an air-operated chuck and tailstock. The single control Marton unit and sequence valve will operate both in correct sequence at any predetermined point in the pressure cycle.



Landex type LL die heads are arranged to distribute wear of latching blocks over a wider surface

## Landex Die Head Improved To Decrease Replacements

The Landis Machine Co., Waynesboro, Pa., announces the type LL Landex head which supersedes the type L head and has several features which assure greater thread accuracy.

The major improvement of the type LL over the type L head is the use of latch blocks which take the place of the locking ring in the type L head. The latch block abutments are readily reground after they have become worn in service, making a quick and economical means for repairing the die head. The latch blocks, in this head, are positioned in the adjusting ring. The abutments contact the back face of the closing ring in latching the head in the closed position. As the die head is adjusted for different diameters, the latch blocks are continually using a different position on the abutting surface of the closing ring; with the result that wear of any appreciable amount is extended over a considerable length of time.

The type LL head comprises four major parts whereas the type L head had five major parts. The chaser holders for the type LL heads are interchangeable with the chaser holders employed with the L type head.

## TRADE PUBLICATIONS

**Air Cylinders**—Catalog No. 50 illustrates and describes seven models of non-rotating, double-acting air cylinders. Featured also are a high-speed rotating air cylinder of aluminum alloy and several types of air valves. The Geroter May Corp., Logansport, Ind.

**Air Motors**—An 8-page booklet of installation drawings, application photographs, and data on two sizes of reciprocating cylinders known as Bellows "Air Motors." The Bellows Co., 861 E. Talmadge Ave., Akron 10, Ohio.

**Automatic Screw Machines**—A well-illustrated 20-page catalog setting forth the construction features which make these screw machines quick to set up, easy to maintain, as well as long-lived and accurate. Dimensions and specifications of many types are included. Greenlee Bros. & Co., Rockford, Ill.

**Blast Nozzles**—Catalog 27, contains 12 pages of material on three types of "Long Lyfe" blast nozzles complete with prices. American Foundry Equipment Co., 500 S. Byrkit St., Mishawaka, Ind.

**Broaching**—Bulletin VBS-45 is a 4-page folder describing a series of hydraulic broaching presses from 4- to 10-ton capacity, complete with all specifications. Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit 13, Mich.

**Casting**—Bulletin 645 describes a machine for centrifugal casting of metals. Table is mounted on an antifriction hub which is belt driven from a motor. Centrifugal Machine & Engineering Co., 633-655 Jackson Court, Kalamazoo 7, Mich.

**Clamps**—Looseleaf folder describes models 225 and 230 clamps with a maximum range of 45 deg. of arc and reaches of 2½ in. and 3 in. respectively and openings of 5 in. and 6 in. respectively. The Mechanics Engineering Co., Box 243, Jackson, Mich.

**Cone-Drive Gearing**—Photographs and diagrammatic sketches in 8-page Bulletin No. 632 illustrate the compactness of this system when applied to various machine tools. Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

**Controls**—Bulletin 178 describes electronic motor controls for a full range of adjustable, stepless speed variation with all the advantages of a d.c. motor from a.c. lines. Electron Equipment Corp., 917 Meridian Ave., S. Pasadena, Calif.

**Conveyors**—Form 345 of 12 pages about "Barrel Conveyors in the Petroleum Industry" illustrates the layout and describes methods for conveying and delivering steel barrels. Lamson Corp., 303 Lamson St., Syracuse 1, N. Y.

**Couplings**—Bulletin No. 107 of 4 pages illustrates and describes a self-sealing coupling which can be used to disconnect liquid carrying lines without the customary need of draining the system and priming after reconnection. Aeroquip Corp., 303 S. East Ave., Jackson, Mich.

**Cutting Torches**—Form 52 gives 34 pages of description of torches designed to handle all types of hydrocarbon flame cutting. Fifty-odd different tips are illustrated together with suggestions regarding their selection and use. Prices included. Victor Equipment Co., 844-54 Folsom St., San Francisco 7, Calif.

**Color Dynamics**—A 24-page booklet "Color Dynamics in Industry" relates the principles of scientific application of color to machines, walls, ceilings, aisles, danger zones so as to create greater efficiency in manufacturing operations through elimination of eyestrain and the creation of better visibility of all objects and areas in a manufacturing department. The Pittsburgh Plate Glass Co., 632 Duquesne Way, Pittsburgh 22, Pa.

**Chemical Finish**—"Enthone Ebonol Coloring and Blackening Processes for Metals" is an 8-page illustrated booklet describing coloring processes for copper and copper alloys and blackening processes for zinc and steel. The Enthone Co., Department AM, New Haven 2, Conn.

**Electronics**—Six-page discussion of "Metal Disintegration by the Thomas Process" illustrates examples of metal disintegration on all types of ferrous metals, in addition to the removal of broken and embedded taps and small tools from all types of materials. Clinton Machine Co., Clinton, Mich.

**Facilities**—A 16-page book "Contract Production Facilities at Sear-

# MULTIPLE CUTS ON TOUGH S.A.E. 4140 STEEL

# SUNICUT 209...

## More parts produced with accuracy and fine finish

Here's a case-history that proves the importance of the right cutting oil! A plant had to produce vital parts quickly. With the aid of Sunicut 209, the transparent sulphurized cutting oil, they were able to turn out their quota of parts rapidly, with extremely close tolerances and fine finish.

Type of Machine: New Britain-Gridley Automatic Screw-Machine, 2" Capacity, No. 61, Six Spindles.
Metal:.... S.A.E. 4140 Bar-Stock.
Operation: Forming, drilling, tapping, and threading.
Speed:... 85 SFPM
Feed:..... .005"
Lubricant: Sunicut 209

**Some manufacturers** of this part were unable to perform the difficult tapping-operation all on one machine. A secondary operation was necessary, which resulted in the loss of production-time. Use of Sunicut 209 permitted all operations on one machine. Production was speeded up and fine-quality threads produced. Rejects were practically eliminated.

**Sunicut 209** is a free-flowing, transparent, correctly balanced sulphur, lard, and mineral oil combination. It is the right combination to BETTER machine-tool output. For actual proof of what Sunicut can do for you, test it in your own shop under your own operating-conditions!

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Available in rubber or resinoid—a full range of styles and sizes. 3 bond types—for every operation.

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Size .....
To Cut.....

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City ..... State .....

les" illustrates and describes the type of equipment for welding and gives examples of the product made in large quantity output. Searles Electric Welding Works, 1310 S. 47 Ave., Chicago 50, Ill.

**Filtering**—Form 255 of 20 pages describes and illustrates "Electronics in Air Filtration," which shows the removal of 90 percent of the dust in the atmosphere. American Air Filter Co., Inc., First and Central Aves., Louisville 8, Ky.

**Flexible-Shaft Machines** — Catalog No. 44 "The Wyco Line" contains 28 pages covering all sizes and types of flexible-shaft equipment with all the motors, tools and accessories. Wyzenbeck & Staff, Inc., 838 W. Hubbard St., Chicago 22, Ill.

**Gage**—A six-page folder describes a flow gage for registering the direction and extent of flow of viscous liquids up to 150 psi. It has a permanent magnet for moving the indicator. The Ohio Pattern Works & Foundry Co., 2735 Colerain Ave., Cincinnati 25, Ohio.

**Gear Finisher**—Bulletin No. 861-4B-45, describes a machine designed specifically for high-output finishing of small precision gears. Michigan Tool Co., 7171 E. McNichols Blvd., Detroit 12, Mich.

**Gear Teeth**—Publication No. M-1397 "Cutting Teeth on a Milling Machine" contains brief instructions on cutting worms and worm wheels and spur, helical and bevel gear teeth on a milling machine. The discussion is general and may be applied to any type of machine. The Cincinnati Milling Machine Co., Marburg & Klein Sts., Cincinnati 9, Ohio.

**Grinding**—"Facts About Crush Form Grinding Precision Contours" is the title of a booklet describing in detail the requirements of the process and how the desired result is accomplished. Thomson Crush-Form Contour Grinding Development Laboratory, Dept. 20, Springfield, Ohio.

**Industrial Vision Testing**—A systematic method for measuring employees' job-aptitudes based on objective sight tests. Non-corrective in purpose, it analyses various vision powers in order to promote safety and efficiency for the individual. "Vision in Industry" explains the "Ortho-Rater," its construction and use, and another booklet, "The Industrial Vision Institute" describes

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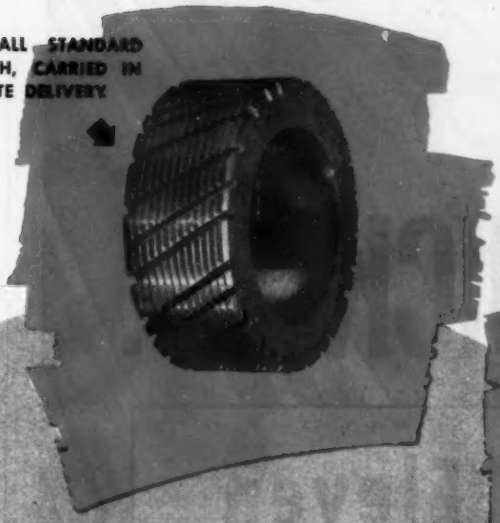

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POWER CRUSHING DEVICE FOR USE ON A SURFACE GRINDER.

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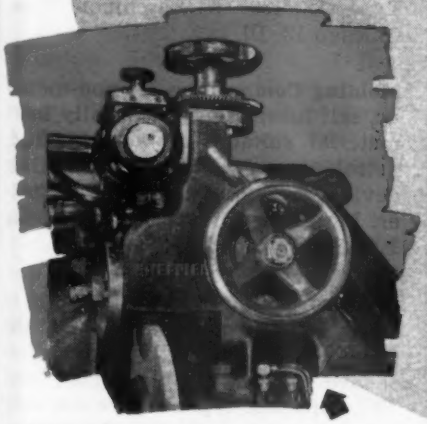
Grinding with crush dressed wheels has so many advantages from the standpoints of accuracy, speed, and economy that it took little time for it to become firmly established in the metal working industry. Sheffield, the American pioneer of this practice on a commercial basis, can furnish you with the equipment you need to put it into operation in your own plant.

SHEFFIELD PRECISION THREAD AND FORM GRINDER FOR DUPLICATING CRUSHER ROLLS AND THE MASS PRODUCTION OF WORK PARTS THREADED OR FORMED.



POWER CRUSHING DEVICE FOR USE ON THE SHEFFIELD THREAD AND FORM GRINDER FOR THE ACCURATE CRUSHING OF WHEELS.

SHEFFIELD MICRO-FORM GRINDER FOR PRODUCING THE ORIGINAL CRUSHER ROLL, FLAT OR CIRCULAR FORM TOOLS AND PROFILES OF ALL KINDS.

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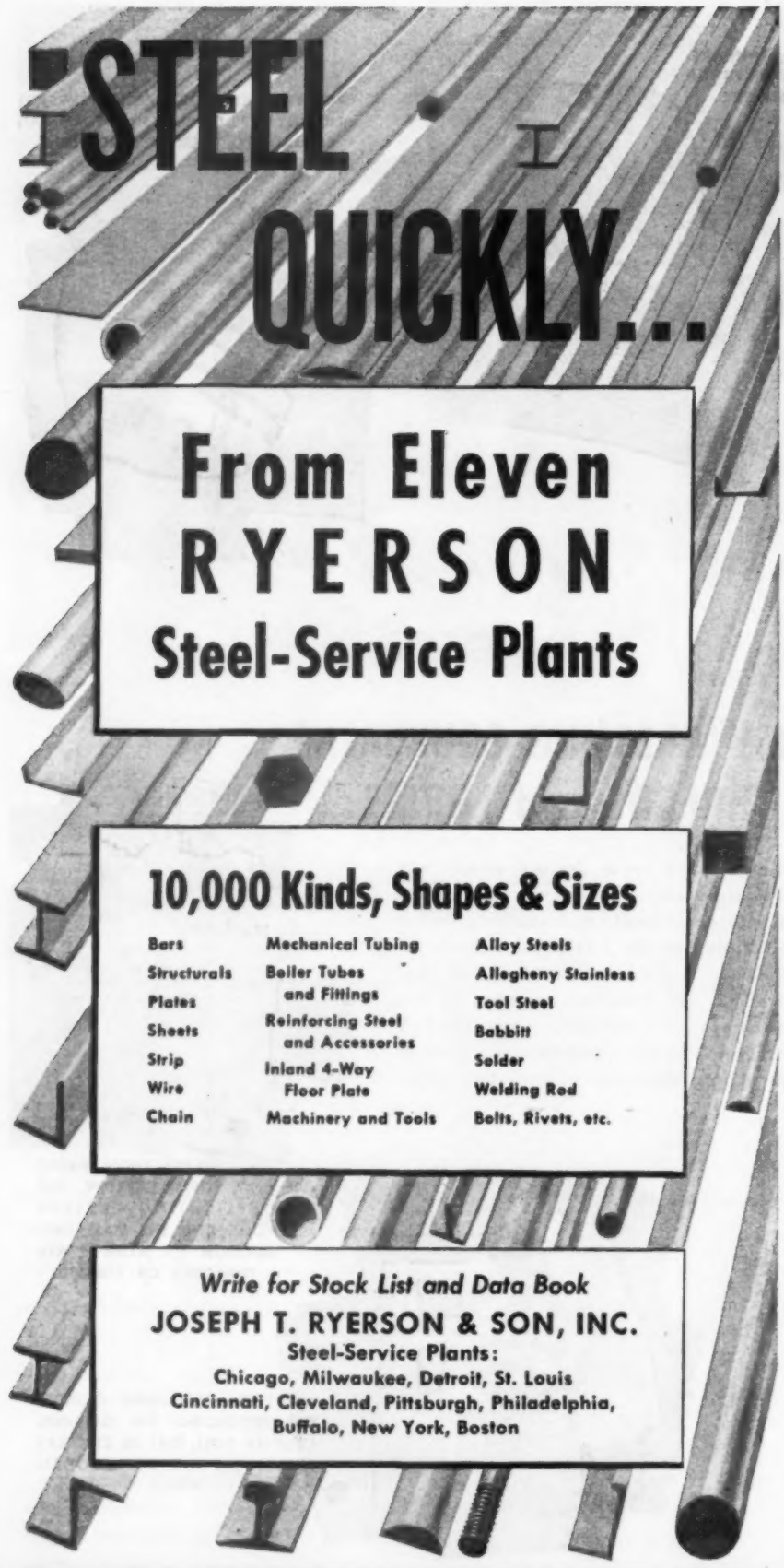


the development of the method and the training courses for testing personnel. Bausch & Lomb Optical Co., Rochester 2, N. Y.

**Jig Parts and Accessories**—48-page catalog containing full-size templet drawings of jig, fixture, die and special machinery components and accessories. Jergens Tool Specialty Co., 15957 Euclid Ave., Cleveland 12, Ohio.

**Lubricators**—"When You Reconvert" is an illustrated 4-page folder which sets forth the advantages of mechanical lubricating systems for large machinery units of all kinds. The Farval Corp., 3249 E. 80th St., Cleveland 4, Ohio.

**Machinery Check Lists**—Allis Chalmers has prepared three brief circulars offering worthwhile suggestions to users of centrifugal pumps, electric motors, and V-belt drives to aid them in appraising existing equipment with an eye to the future: "Bulletin! How to Take a Reconversion Inventory." Allis Chalmers, Milwaukee 1, Wis., or any branch office.

**Marking Equipment**—Fifty-page illustrated catalog giving complete data on the machines, type faces, and inks for the efficient marking of mass produced parts. The Superior Type Co., 1800 W. Larchmont Ave., Chicago 13, Ill.

**Molding Composition**—A non-metallic, self lubricating, chemically inert material suitable for use in food, petroleum, and chemicals handling devices is described in colored folder. Morganite Brush Co., Inc., Long Island City 1, N. Y.

**Motors**—Users of motors of 1/200 to 1/20 hp. will be interested in the following bulletins: 10A covers shaded pole; 10B, universal; and 10C, capacitor types. There are only two frame sizes for all the motors and within each size, all are interchangeable. Robbins & Myers, Inc., Springfield, Ohio.

**Motor End Bells**—This company specializes in ball and roller bearing applications and this 8-page bulletin illustrates how ball bearing end bells have modernized old motors of many kinds, and states the many improvements gained by the conversion. Keystone Electric Co., 1210-1230 Ridgely St., Baltimore 30, Md.

**Needle Bearings** — "Torrington Needle Bearings, Engineering and

Application Data, Edition 32" is a 153-page manual supplying information on bearings identified as Types LN, DC, NCS, AT and RC. A separate section complete with drawings shows how to employ these bearings in many typical power transmissions, and anti-friction applications where high capacity and minimum space are requisite considerations. The Torrington Co., Bearings Div., Torrington, Conn.

**Porcelain Enamel**—Illustrated Brochure entitled "Porcelain Enamel, Its Characteristics and Qualities" describes the preparation and application of enamel and suggests many uses to which it is adapted. Porcelain Enamel Institute, Inc., 1010 Vermont Ave., N.W., Washington 5, D.C.

**Reclaiming Porous Castings**—Bulletin C-1-A gives complete information as to use, specifications, and price of the Mogul Circulator M-1500, which forces a colloidal sealing liquid under pressure into any defects. The Metallizing Co. of America, Industrial Div., 1330 W. Congress St., Chicago 7, Ill.

**Roto-Shaving**—7-page folder explains this high-speed finishing process and describes the machines and cutters employed. National Broach & Machine Co., Red Ring Products, 5600 St. Jean, Detroit 13, Mich.

**Stainless Steel Strip**—A 28-page booklet on the applications of this metal, together with all necessary engineering data and detailed processing information enabling a designer to select which of the 14 chemical compositions offered will best suit his needs. Superior Steel Corp., Grant Bldg., Pittsburgh, Pa.

**Steel Products Manual**—This handbook is being prepared in sections. Section 14, now available, deals with the manufacture and specifications of various kinds of tin plate and how it is packaged for shipment. American Iron & Steel Institute, 350 Fifth Ave., New York 1, N. Y.

**Steel**—Library of Stainless Steel Information No. 1 deals with the "Heat-Treatment of Stainless Steels"; No. 2. treats the "Machining of Stainless Steels." These books furnish up-to-the-minute information about the treatment, fabrication and application of the various grades of stainless steels. All data is obtained from actual experience. Rustless Iron and Steel Corp., 3400 E. Chase St., Baltimore 13, Md.

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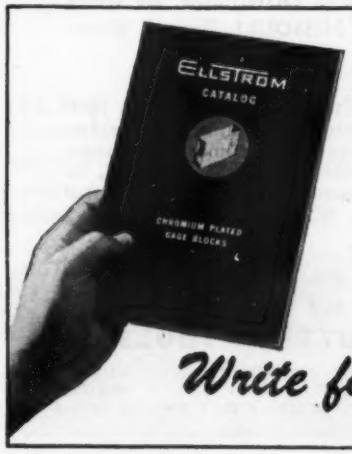


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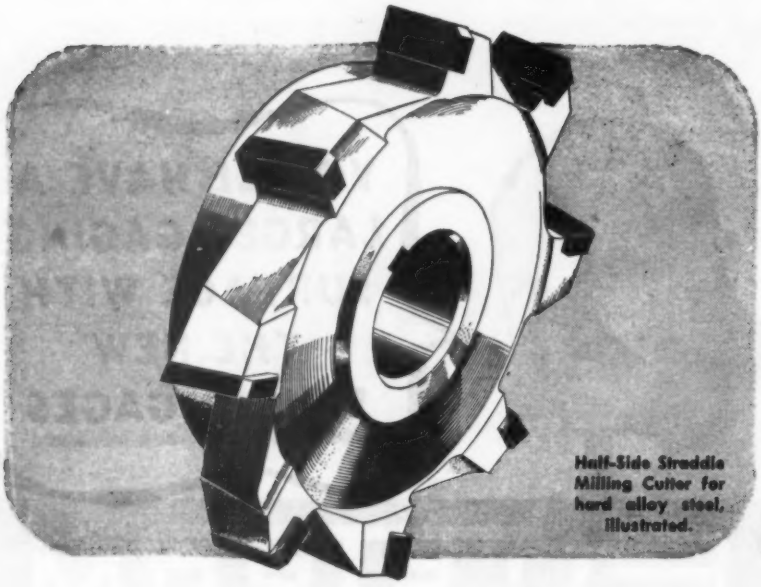

Half-Side Straddle Milling Cutter for hard alloy steel, illustrated.

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*as many as*

# 10 TIMES

*with these new standard carbide tipped*

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**Steel**—A 16-page booklet "Fitting the Steel to the Job" explains the uses and advantages of "tailor made" steels to reduce unit costs and improve product performance. The Carpenter Steel Co., 309 W. Bern St., Reading, Pa.

**Steel**—A 170-page, pocket-size catalog and manual about "The Tool Steels of Allegheny Ludlum" provides a complete coverage of tool steels for all uses and users. Allegheny Ludlum Steel Corp., Brackenridge, Pa.

**Steel**—A 24-page booklet about tool steel drill rods made from various grades of water and oil hardening steel as well as high-speed steel. The Carpenter Steel Co., 1937 Palmer St., Reading, Pa.

**Strippers**—Form WSB-1144 describes and illustrates hand, foot and power operated wire strippers for removing insulation, armor and lead sheathing. Ideal Commutator Dresser Co., 1291 Park Ave., Sycamore, Ill.

**Tools**—Looseleaf binder indexed to illustrate and describe drilling, boring, milling and other special types of machines. Data sheets give engineering dimensions and there is a section on performance data. W. F. and John Barnes, 345 S. Water St., Rockford, Ill.

**Tools**—Folder N-1 (Rev) describes, illustrates and gives dimensions for 12 sizes of Dialset boring tools which can be set to micrometric precision. State Manufacturing & Constructing Co., 1940 N. Dixie Highway, Franklin, Ohio.

**Tools**—A 72-page condensed catalog showing a complete list of machine tools, small tools and gages of many types. Pratt & Whitney Division Niles-Bement-Pond Company, Charter Oak Park, West Hartford 1, Conn.

**Tools**—Catalog No. 26 precision tools, steel tapes, dial indicators and hacksaws; 2nd Edition of Dial Indicator catalog with supplement and price list and a 28-page booklet of numbers and sizes of tools now manufactured. L. S. Starrett Co., Athol, Mass.

**Tools**—Booklet "Fifty Facts" cites the experience of 50 manufacturers showing how tools in common use can be made to last longer through a better way of hardening soft steels. Perfection Tool & Metal

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When the urgent call for defense—then war—production sounded throughout the nation, industry faced the huge task of swiftly training millions of "green" workers from all walks of life.

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Send for descriptive booklet—GT-155.

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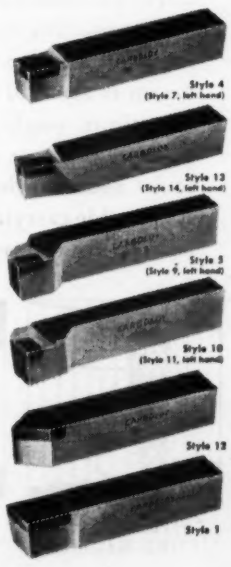


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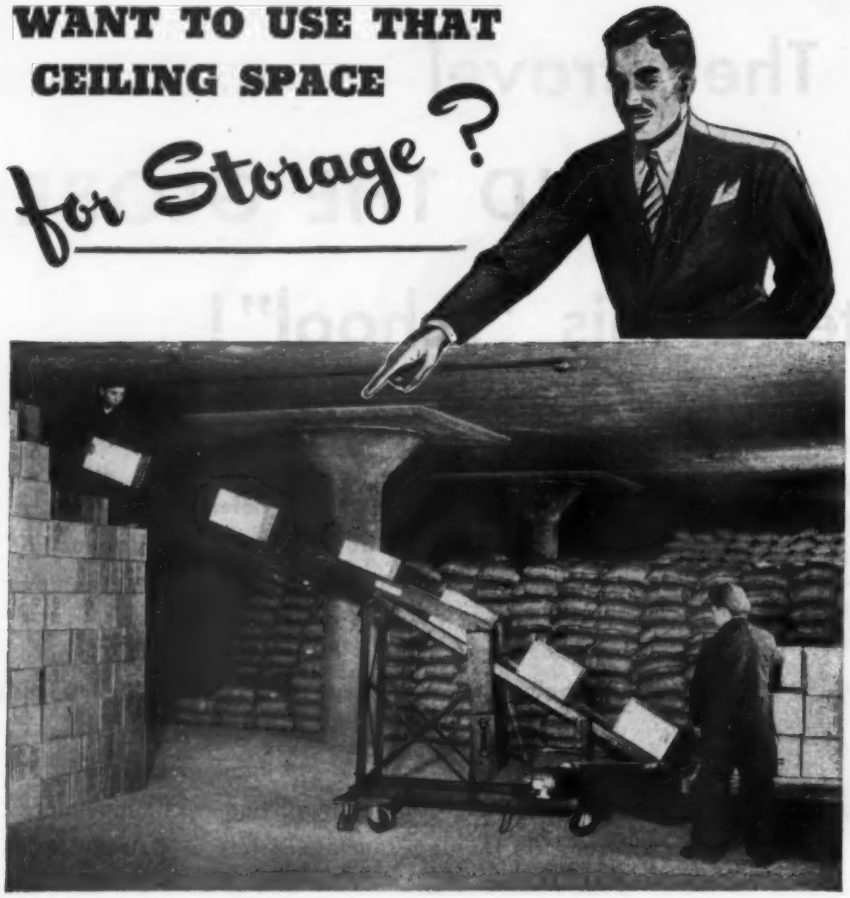

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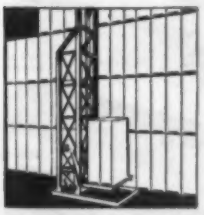
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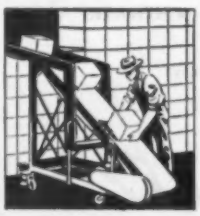
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**Tapping**—"Handy Tap Guide" for designers and machinists. In addition to basic thread dimensions and tap drill sizes, cutting fluid recommendations and other reference data for all kinds of machining are included. The Wood & Spencer Co., 1928 E. 61st St., Cleveland, Ohio.

**Unichrome Dip**—Folder describes special process for protecting zinc and cadmium surfaces. Finish can be either black or olive drab and is easy to use. Results show high corrosion resistance obtained. United Chromium, Inc., 51 E. 42nd St., New York 17, N. Y.

**Welding**—Folder describes a Technicolor sound film about arc welding. The Lincoln Electric Co., 13010 Coit Rd., Cleveland 1, Ohio.

**Welding**—Bulletin SS145 gives data about the properties and welding procedure for stainless steel electrodes. Alloy Rods Co., York, Pa.

## TO THE EDITOR

Dear Editor:

As a soldier and a reader of your magazine for the past four years, I have a philosophical observation which will perhaps be of interest to you. It involves future economic policies in which the machine tool industry can play an important role.

For a century or so past the machine tool industry has tended to throw larger aggregations of men together to make a given article. The watchmaker of yesterday has multiplied into the 100-man unit of today, and so with most any line of effort one can name.

Can products be made by smaller aggregations of workers? I believe the answer to be in the affirmative. Large units lead to bureaucratic methods of thought and tend to make it hard for employees to distinguish between a large corporation and the national government in their daily thinking.

Control of the units should be maintained by central financing and improved machines could replace the inefficient producers, thus making people fully understand the meaning of obsolescence. Trade names and group retailer controls are needed to enable the public to have confidence in buying. The "Big Money"

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Among the features indicated below are many of the reasons for the high overall mechanical efficiency and the high volumetric efficiency of Vickers Variable Delivery Piston Type Pumps. Also, the inertia forces of the rotating parts are minimized . . . the cylinders are arranged axially permitting more compact design.

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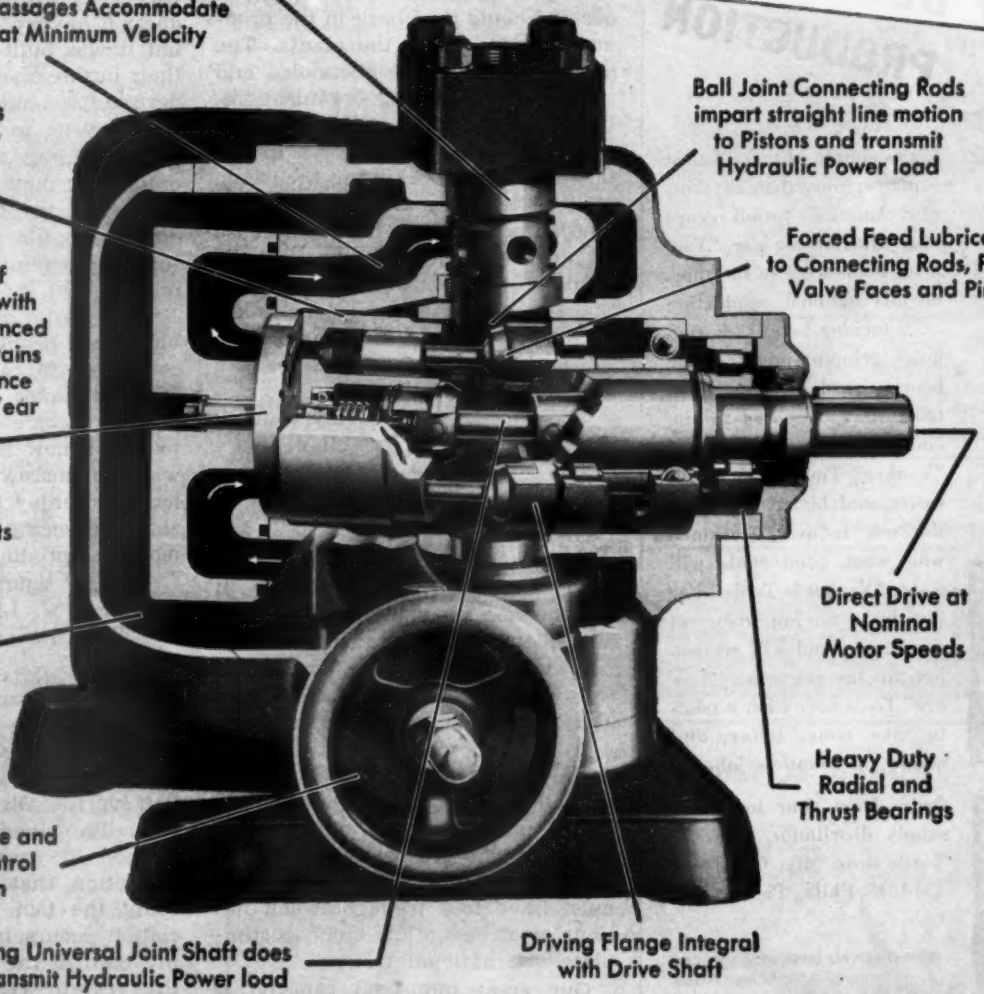
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It's as simple as that. And it explains, more than anything else, America's proud record of production for war. "Yankee" Tools were in the thick of this national production . . . turning screws, boring holes, gripping metals at the bench . . . doing what good tools were supposed to do, and what the ingenuity of "Yankee" Tools does faster, easier, and better. Now that the war is over, workmen who want good tools will want "Yankee" Tools. For they know the importance of good tools, and will remember this famous name. "Yankee" Tools have what it takes to save time, labor, and money on countless jobs.

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could devote itself to financial control in many forms and thereby be able to direct improvements. This would go far toward the solution of the little business man problem and would provide a balanced pattern into which he could fit.

Buying is where the public is afraid of the little business man. The person who wants to be a little business man hesitates to buy things from someone already set up as such. If 500 makes of cars were distributed under the names of the present leading auto manufacturers, the public would buy them because it would have confidence that the big firms had checked their design and quality.

A blueprint for the machine tool business might take the form of evolving small unit production to match the efficiency of big units. Sell production on the idea of putting up many small plants and in turn selling them to the workers on the basis of being paid back in the products turned out by the plants. The goods could then be channeled and sold through existing organizations. In this way, those making up the small units would receive a monetary return by working in their own plant. New equipment would be purchased from time to time because of the competitive nature of the small units. It is my sincere belief that something has to be done to kill the mass irresponsibility threat, and the scheme I have outlined seems a step in that direction.

Very truly yours,
Russell V. Dye

---

Dear Editor:

In order to reap the benefit of world peace and have prosperity, it will be necessary to give considerable thought to our own condition, particularly the matter of tariffs. We cannot prosper and make jobs for all if we keep high tariffs and wages.

Labor and management drawing battle lines, with strikes, shutdowns and all sorts of disputes, presents a dismal picture. To get our share of future world prosperity, labor and management must cooperate; and we must have free trade between nations or at best a low tariff to stimulate international trade.

Our great industrial capacity is capable of supplying a great deal of the world's commerce. This great industrial capacity will give management a profit and labor a wage commensurate with the business secured and produced. After all, the controlling factors are supply and demand. We will not receive the orders if prices are much higher than those levied by other nations. Our production capacity must tip the scales of competition in our favor.

Very truly yours,
Karl M. Goldsmith
New York, N. Y.

---

Dear Editor:

After reading your editorial relating to "Surplus Machine Tools" I thought I'd send along some of my views, based on 48 years of experience in machine shops, including tool, die and pattern making.

You write that our real surplus problem is 700,000 machines that are over 15 years old, and say they should be scrapped. When I started my own business as a one-man shop 20 years ago, I bought a second-hand 18-in. heavy-duty Shumacher and Boye and Emes engine lathe, which was then about 25 years old. It doesn't have a lot of attachments but it was built by men who knew their business and I can still get the desired 0.005 out of it.

You write to the effect that surplus machines are a national asset only when they are put to work. I'll agree that my old lathe is slow in doing versatile jobs, but it helps to support my family, pay taxes including personal, income and sales taxes. True, a faster machine would provide more profit and thus more income, and in turn I would have to pay more taxes. But as it stands, my present income does not permit me to buy a new machine as I do not want to borrow money. Nevertheless I do enjoy reading your magazine and seeing the wonderful new machines produced by our industry.

Yours truly,
C. Langer, Proprietor,
Langer Machine Shop.

---

Dear Editor:

The problem set forth by Mr. J. L. Trecker in relation to "Depreciation versus Obsolescence" may be partially solved by establishing a method of arriving at yearly depreciation that will take into account the fact that greater depreciation occurs in a machine's early life than in the later years. In fact, the year-by-year value of a used machine is one of diminishing return.

A formula that accomplishes this which the writer has found extremely simple and fair and which was readily accepted by the Canadian Custom Authorities some years

ago when importing second-hand equipment into that country may be set forth as follows:

After establishing the number of years (N) of the machine's life, total the number of terms in the arithmetical series of 1 to N using the formula Sum equals (N/1) N/2. Thus if 20 years is the life of the machine, the series total will be 210. The depreciation for the first year will be 20/210 of its value, for the second year 19/210, for the third year 18/210, and so on for any year of its 20-year life, the depreciation for the twentieth year being but 1/210.

In the example cited by Mr. Trecker, the $80,000 equipment becomes obsolete after seven years but still has a book value of $52,000, having depreciated but 35 percent though its second-hand value is only $20,000, entailing a loss of $32,000. If the above formula is used the total depreciation for seven years will be 119/210 of the $80,000, or the value still on the books will be 91/210 which is approximately $35,000 as against the common method value of $52,000. Though this does not absorb the total shrinkage due to obsolescence it has cut the loss to $17,000, a saving well worth considering.

The writer is not an accountant so that there may be flaws in his reasoning which he would be only too glad to have pointed out, but he has used this method and it worked to the advantage of the company using it.

Very truly yours,
Louis deL. Berg,
West Hartford, Conn.

## Where a Flywheel Paid

A RECENT CONTACT with a man responsible for milling production revealed a most interesting condition. On a special job requiring several cutters the initial set-up gave a cutter life of only 50 pieces between grinds. Not wanting to use a flywheel if it could be avoided, he put a substantial overarm support for the arbor and increased the cutter life to 500 pieces between grinds.

This was a substantial increase over the original set-up. But being of an inquiring turn of mind he decided to go "whole hog" and put a heavy flywheel on the back end of the spindle. It is still there, and now he uses flywheels on all jobs where the machine is using most of the power of the motor. For with the flywheel the cutter life is now 3000 pieces per grind.


New Keyless Chuck
does its own drill tightening

THE TURNER CHUCK Saves Time!

Hardened bearing steel roller jaws grip the drill without chewing or scoring.

Grip is automatically and progressively strengthened with increased load pressure

Ball bearings increase life.

Absolutely KEYLESS. No more chewed drill shanks. No more time wasted looking for keys.

The Turner Chuck is self-energizing. Tightens itself by the action of the drill.

Drill will not slip in use. Chuck is automatically self-centering and drill runs true without hand adjustments.

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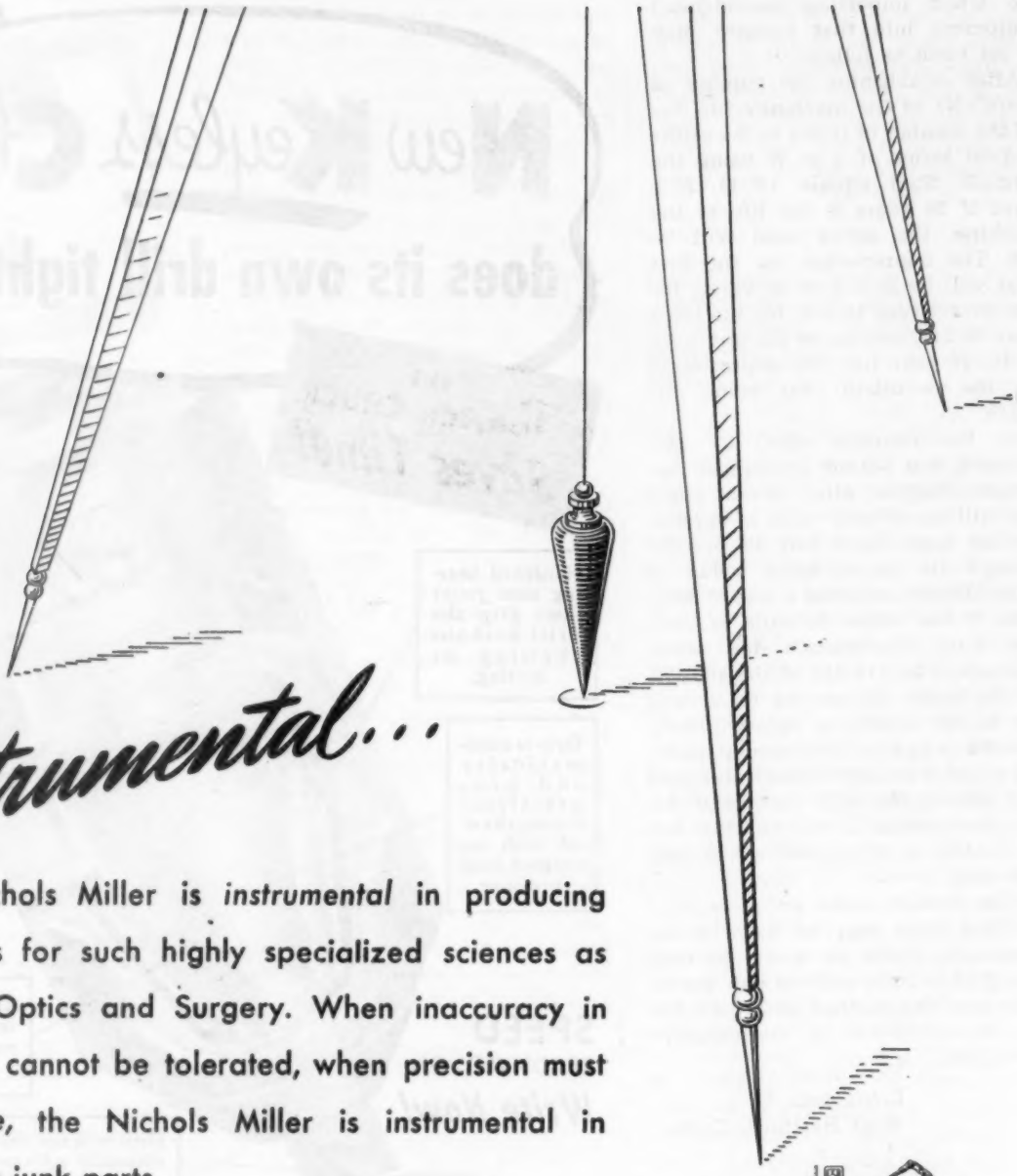
THE SINGLE STYLE TURNER CHUCK IS AVAILABLE IN:

4 DRILL CAPACITIES
A-1/32 to 1/16 DRILL
B-1/16 to ⅛ DRILL
C-⅛ to ¼ DRILL
D-¼ to ½ DRILL

3 BODY SIZES
15/16 x 1¾
15/16 x 1¾
1½ x 2½
2¼ x 3¾

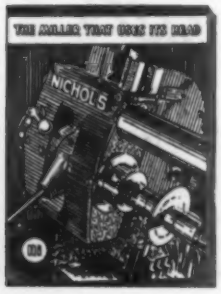


# *Instrumental...*

The Nichols Miller is *instrumental* in producing instruments for such highly specialized sciences as Aviation, Optics and Surgery. When inaccuracy in machining cannot be tolerated, when precision must be *precise*, the Nichols Miller is instrumental in eliminating junk parts.

As a middle-sized machine, the Nichols Miller is ideal for many second operations — for the light and medium cuts peculiar to the instrument-making field.

When the manufacture of your instruments requires an *extra* degree of accuracy, economy and speed in production, use the Nichols Miller.

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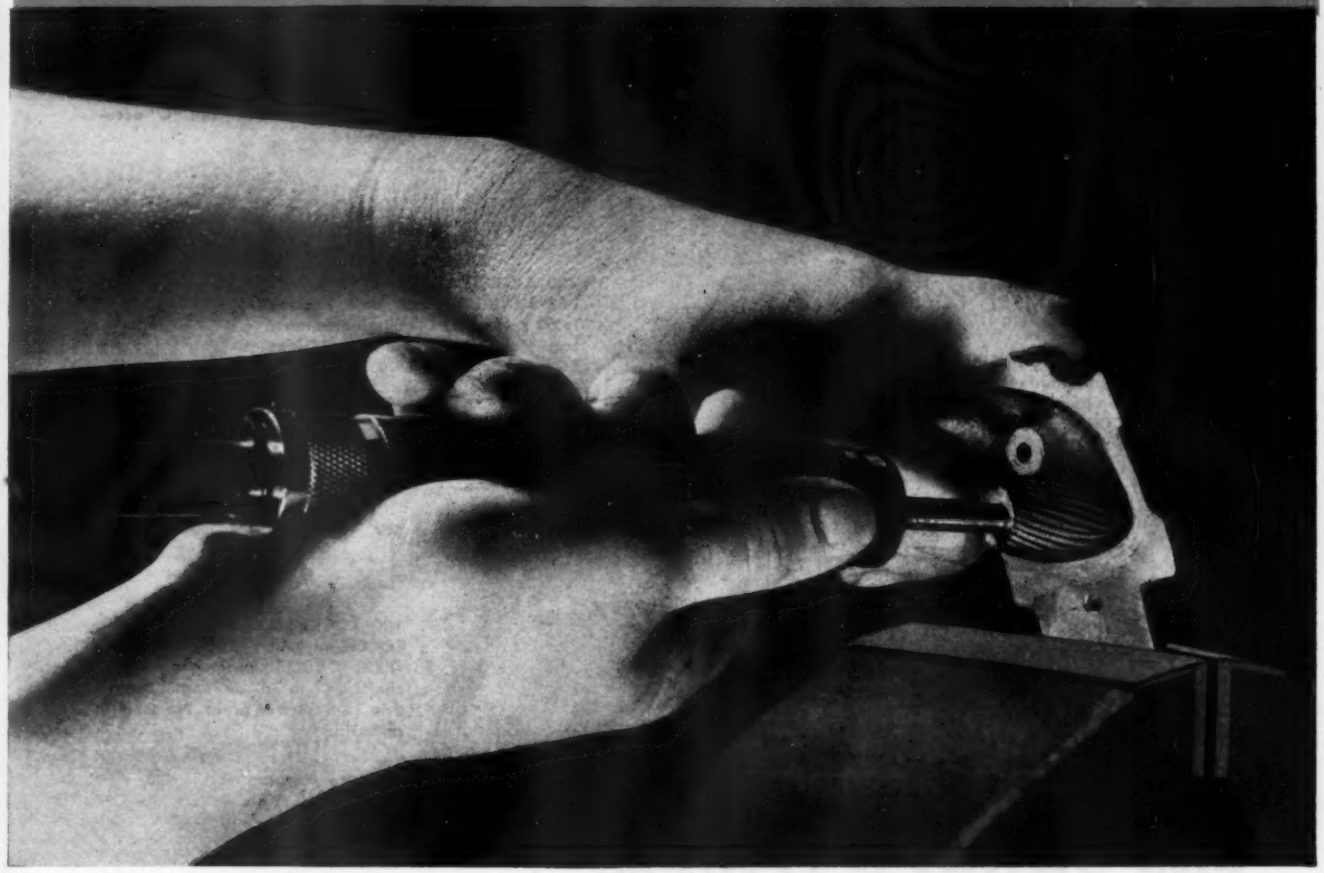

ONE of the most popular of the many shapes of Nicholson Rotary Files is the *Oval* shape. It is action-illustrated above, where you see it performing the double duty of cleaning out a rounded *groove* and a spherical *cup*.

Nicholson Rotary Files come in three coarsenesses, in either Hand Cut or Ground type: *Coarse*, for use on foundry castings; *Medium*, for brass, bronze, soft steels, cast iron and die-cast metals; *Fine*, for extra-hard materials and for smooth finishing generally.

Uppermost in any selection of Rotary Files should be *quality*. When they bear the Nicholson trade-mark there's never a question as to their trueness, proper cut, expert hardening — plus manufacture out of fine high-speed steel.

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**16 STANDARD SHAPES**

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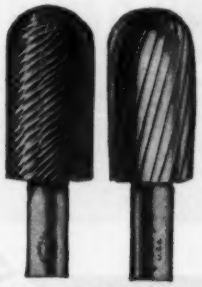

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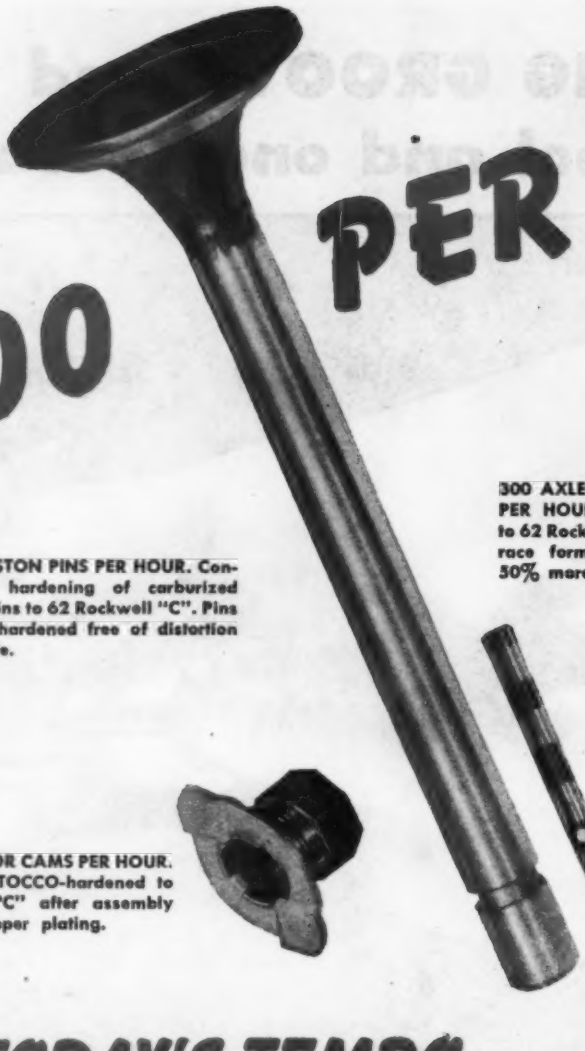
**HAND CUT AND GROUND—FOR EVERY PURPOSE**

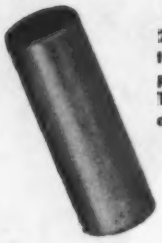
NICHOLSON U.S.A.

# 2500 PER HOUR



Valve stem ends TOCCO-hardened to depth of 3/32". Hardness of 50 Rockwell "C" accurately controlled.

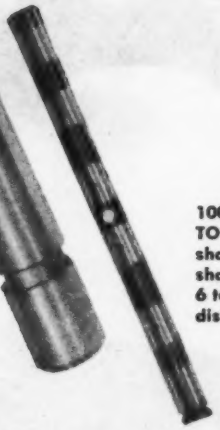
300 AXLE SHAFT BEARING RACES PER HOUR. Hardens axle bearing to 62 Rockwell "C". Eliminates inner race formerly pressed on. Gives 50% more strength.



2000 PISTON PINS PER HOUR. Continuous hardening of carburized piston pins to 62 Rockwell "C". Pins TOCCO-hardened free of distortion and scale.



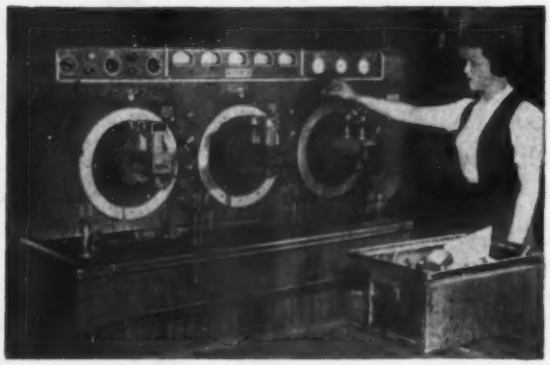
500 DISTRIBUTOR CAMS PER HOUR. Cam surfaces TOCCO-hardened to 62 Rockwell "C" after assembly eliminating copper plating.



100 ROCKER SHAFTS PER HOUR. TOCCO-hardened at six areas per shaft. TOCCO fixture accommodates shafts 14" to 36" in length, having 6 to 12 hardened areas. No scale or distortion.

## FOR TODAY'S TEMPO:

## Get this SPEED and VERSATILITY with a Standard TOCCO Unit



Speedy, accurate TOCCO Induction Hardening enables you to produce better products, faster, *at a fraction of the cost* of conventional heat-treating. One manufacturer gets such results for 142 different parts . . . with one standard TOCCO machine! Fixtures are readily changed, permitting quick tool-up to suit the job.

Find out how TOCCO's speed and versatility can help solve *your* problems and save *you* money. "Results with TOCCO" free for the asking.

**THE OHIO CRANKSHAFT COMPANY • Cleveland 1, Ohio**

**TOCCO**

***INDUCTION***

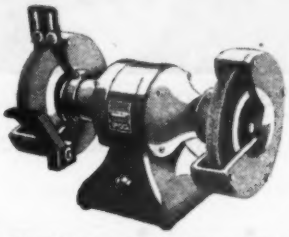
**HARDENING, BRAZING**

**ANNEALING, HEATING**

# They Do More... Better... Faster

## "WHIRLWIND"* WIRE BRUSHES CUT COSTS, STAND UP LONGER ON HIGH SPEED WORK

**For Portable Grinders:** Whirlwind Brushes come in 4" to 8" wheel sizes; made of .014" wire for rough cleaning, .0118" wire for high-speed buffing, .005" wire for fine finishing and burnishing.



**For Stationary Grinders:** Whirlwind Brushes come in three thicknesses, in six wheel sizes from 4" to 12". Can be used on many types of machines. Adaptors fit them to 'most any arbor or spindle.

**For Portable Sanders:** Whirlwind Wire Cup Brushes make quick work of removing rust, scale, old paint; cleaning castings, structural metal, tanks, boat hulls, other surfaces. Made in 4", 5" and 6" sizes.

* Trade Mark Reg. U. S. Pat. Off.

DEVELOPED and made by Black & Decker for high speed work, Whirlwind Wire Wheel Brushes are definitely better, tougher, work faster and last longer. That's because crimped wire gives Whirlwind Brushes extra life and spring . . . assures correct clearance between wires . . . holds the brush in an even, compact mass. And each individual tuft of wire is held in a ring of steel . . . separately . . . securely . . . to stay.

Whirlwind Brushes are available in wheel sizes from 4" to 12" in three thicknesses, and in three gages of wire . . . for use on almost any grinding, buffing or polishing machine and on all Black & Decker Portable Grinders, Bench Grinders and Sanders. Try Whirlwind Brushes now. Order them from your Black & Decker Distributor. Compare the service and satisfaction Whirlwinds give you with brushes of any other make.

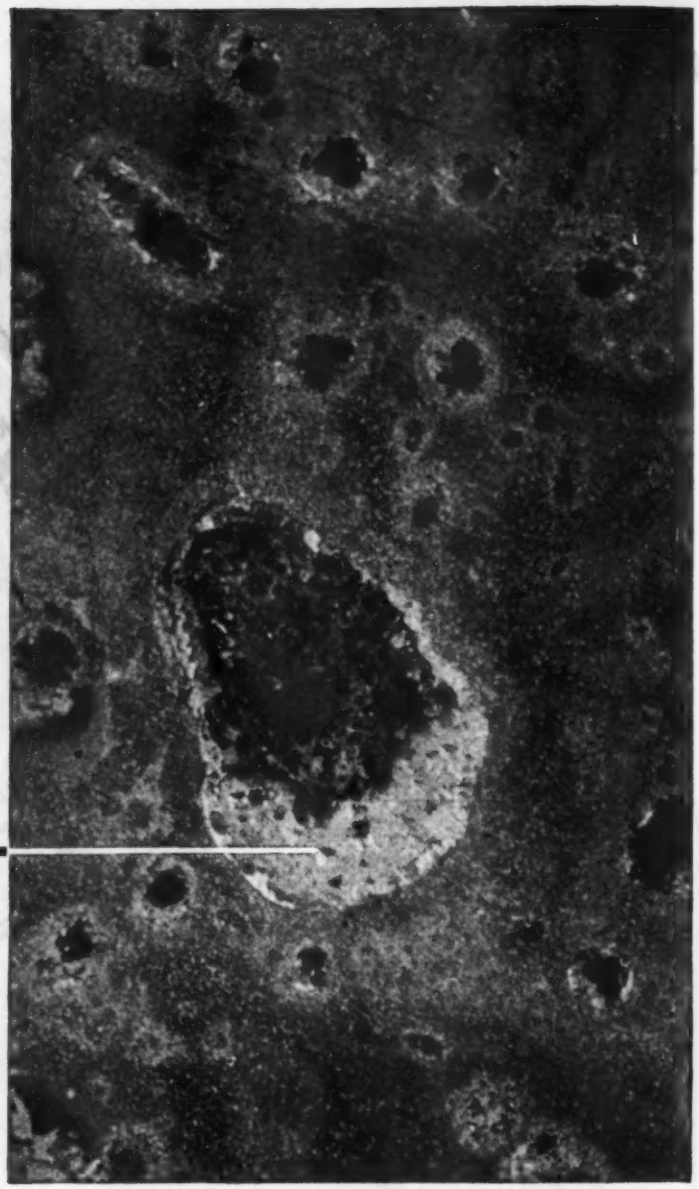
For our complete catalog of more than 100 different Black & Decker Portable Electric Tools and over 1,000 attachments, write to: The Black & Decker Mfg. Co., 616 Pennsylvania Ave., Towson 4, Md.

LEADING DISTRIBUTORS EVERYWHERE SELL

**Black & Decker**

PORTABLE ELECTRIC **TOOLS**

# How much would you save _IF YOU ELIMINATED RUST?——



## RUST COSTS AMERICAN INDUSTRY WELL OVER THE WHOPPING SUM OF $100,000,000 A YEAR!——

Take a minute to figure out how much this liability takes out of *your* pocket—then see if it isn't worth your while to spend a few more minutes with a Cities Service engineer, who will show you how a simple rust prevention plan can quickly eliminate this cost.

Two proved, effective Cities Service products will do the job:

**Cities Service RUST REMOVER** clears metals of rust or tarnish. Works quickly . . . easy to apply.

• • •

**Cities Service ANTI-CORRODE,** in many forms, is available for every industrial need . . . Provides an impenetrable film that protects parts against rust or corrosion.

Cities Service Oil Company
Room 433 70 Pine Street
New York 5, New York

Gentlemen: Please send me full information on Cities Service Rust Prevention Plan.

Name.....

Title.....

Company.....

Address.....

City.....State.....

**Rust can be eliminated . . . and Cities Service can help you. Call our nearest office or—**

## MAIL THIS COUPON TODAY!

CITIES SERVICE OIL COMPANY
ARKANSAS FUEL OIL COMPANY

CITIES SERVICE OILS
ONCE-ALWAYS

# YOU CAN CUT
## YOUR TOOL COSTS...

## *by Recovering Lost Tools*
## AND KEEPING THEM . . .
## *through* McCASKEY

This may sound fantastic and exaggerated, but it's a fact that you can. Let us tell you how by quoting from the published statements of three of our users.

THE first set May 2nd for the opening date for their McCaskey Tool Control System to go into operation. Employees and foremen were instructed to turn in all perishable tools, wrenches, drills, taps, indicators, gages and the like on April 29th. Here's what happened:

"The quantity and variety of tools turned in was enormous. It was a revelation to see what the men had collected over the years. *Tools long since regarded as lost were turned in. A low estimate of the number would be 2500 to 3500 tools.*"

The second reported: "One of the first results of the plan (installing McCaskey) was the turning in of $2000 worth of tools, virtually a windfall, so far as practical use was concerned. It has reduced disputes and losses of tools . . . has already more than saved its cost."

The third stated: "We installed McCaskey at a time when tool deliveries averaged nine months or worse, hoping to cut down theft, loss and breakage that were giving us sleepless nights.

"The system was paid for twice over by the tools located out on the production floor and in employees' tool boxes and lockers. We had been sure that many of them had been stolen; that most of them were gone. Now the McCaskey tells us where our tools are and what every employee has . . . no more 'lost' tools in lockers or under machines . . . and breakage is down too."

McCaskey Tool Control does reduce tool costs in a dozen ways, some with large savings and others indirect but important. The recovery of "lost tools" actually has paid for numerous installations.

*Let us have an industrial systems engineer explain how McCaskey will pay its way from the beginning in your plant . . . or send you factual reports of McCaskey savings in several plants widely recognized for their progressive management.*

**THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO**

***McCaskey Systems Ltd., Galt, Ontario, Canada*** ***The McCaskey Register Co., Watford, England***

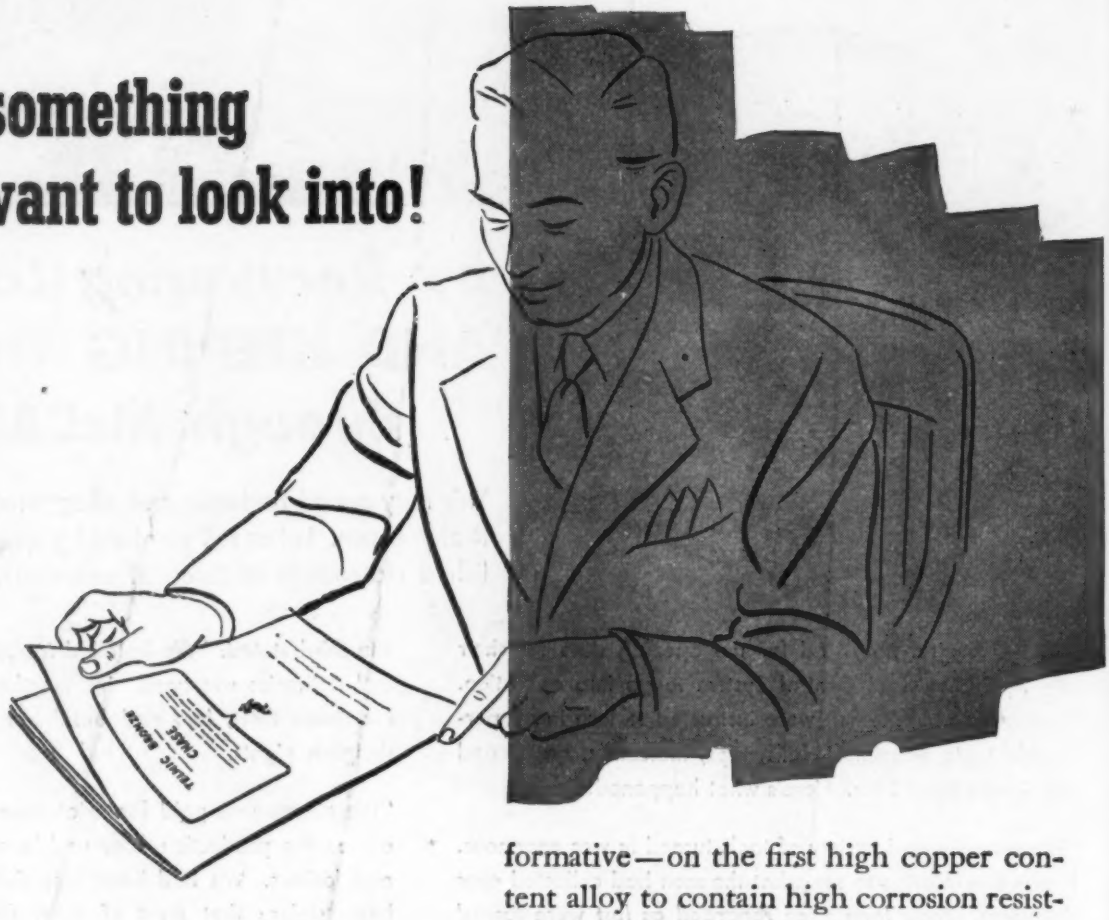
**McCASKEY INDUSTRIAL CONTROLS**

**PRODUCTION • INVENTORY • MAINTENANCE • TOOLS • COSTS • PAYROLL**

# Here's something you'll want to look into!

"TELNIC* BRONZE"—our new booklet on Telnic Bronze contains complete technical information about this patented Chase copper alloy—its properties, machinability and typical uses.

Here is a laboratory report—brief but informative—on the first high copper content alloy to contain high corrosion resistance, excellent hot workability, free-cutting characteristics, age hardenability, high strength and hardness. Engineers, product designers, buyers—anyone who specifies materials, will be interested in this booklet. Send for a complimentary copy of "TELNIC BRONZE." Address **Dept. AM-10.**




CHASE

* Reg. U. S. Pat. Off.

## CHASE BRASS & COPPER CO.

—Incorporated—
*Waterbury 91, Connecticut*
SUBSIDIARY OF KENNECOTT COPPER CORPORATION

ALBANY† ATLANTA† BALTIMORE BOSTON CHICAGO
CINCINNATI CLEVELAND DETROIT HOUSTON
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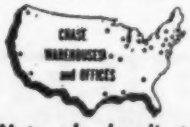
PHILADELPHIA PITTSBURGH PROVIDENCE ROCHESTER†
SAN FRANCISCO SEATTLE ST. LOUIS WASHINGTON†




†Indicates Sales Office Only

*This is the Chase Network—handiest way to buy brass*

# A DRAWING BOARD IN A *Foundry?*

## *No!* . . . but Acme Aluminum Castings Service does include engineering design

WE don't put our drawing boards right out on the foundry floor. But Acme does offer a design service which has proved helpful to many users of Acme Permanent Mold Aluminum Castings. Acme engineers, through their long experience in making tools and patterns, and in working with aluminum and its alloys, can frequently suggest constructive changes in design. Such a change may, for instance, lead to the use of less metal with no sacrifice in casting strength, and a saving to the customer.

Whether or not you call upon the advisory service of Acme engineers, you will gain the benefit of modern production facilities and quality control in the production of your castings. Acme facilities include pattern and tool shop, as well as one of today's most modernly equipped foundries. Close temperature control and rigid inspection methods guard the quality of every Acme casting.

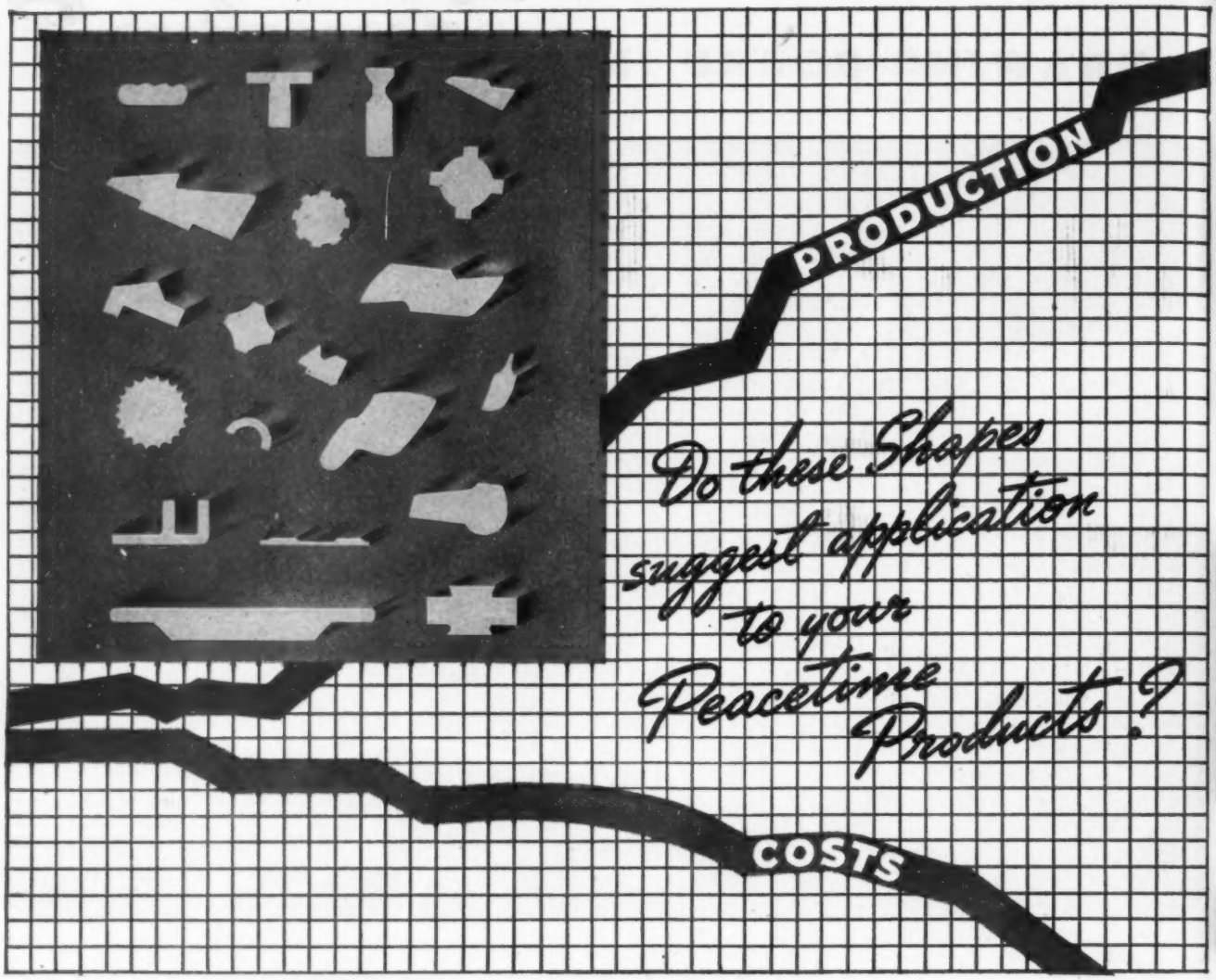
Submit your castings problems to the Acme organization. You'll find that Acme experience and Acme facilities will help you enjoy higher production rates and lower production costs.

# ACME ALUMINUM ALLOYS INC.

DAYTON 3, OHIO

*Patterns · Tools · Aluminum, Brass, Bronze Castings · Engineering*

New York: F. G. Diffen Co., 111 Broadway
Chicago: Metal Parts & Equipment Co., 2400 W. Madison Street, St. Louis: Metal Parts & Equipment Co., 3615 Olive St.




## LET WYCKOFF ENGINEERS AND METALLURGISTS ANALYZE YOUR SPECIFIC PROBLEM

Wyckoff "custom-made" steels in special shapes have conclusively proven their worth in better, faster production at lower cost. Always uniform in grain structure, highly machinable with unusual strength—according to product needs and specifications plus the elimination of such costly operations as heat treating, cleaning, straightening.

Wyckoff engineers will be glad to cooperate with you in developing "cost-cutting" special shapes to meet your specific requirements.

# WYCKOFF STEEL COMPANY

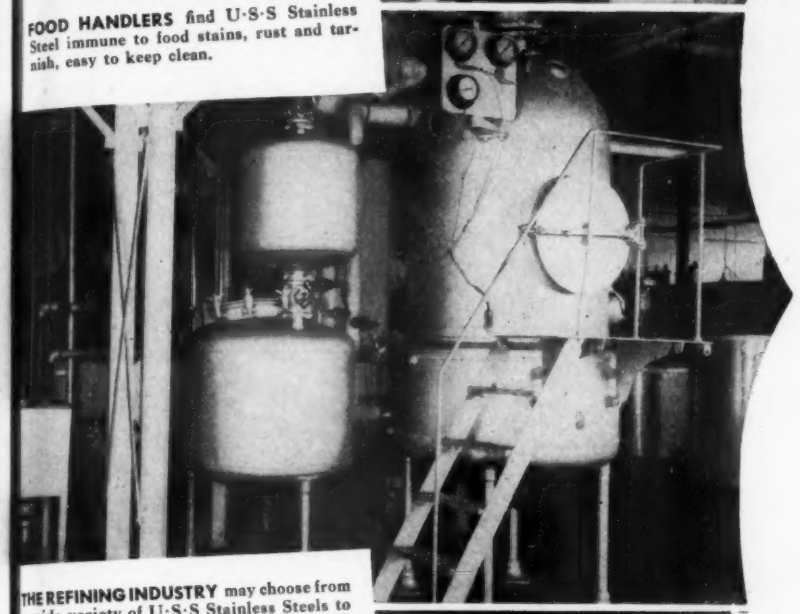
**First National Bank Building, Pittsburgh 30, Pa.**
**3200 S. Kedzie Avenue, Chicago 23, Illinois**

**Manufacturers of Carbon and Alloy Steels — Turned and Polished Shafting—Turned and Ground Shafting—Wide Flats up to 12" x 2".**

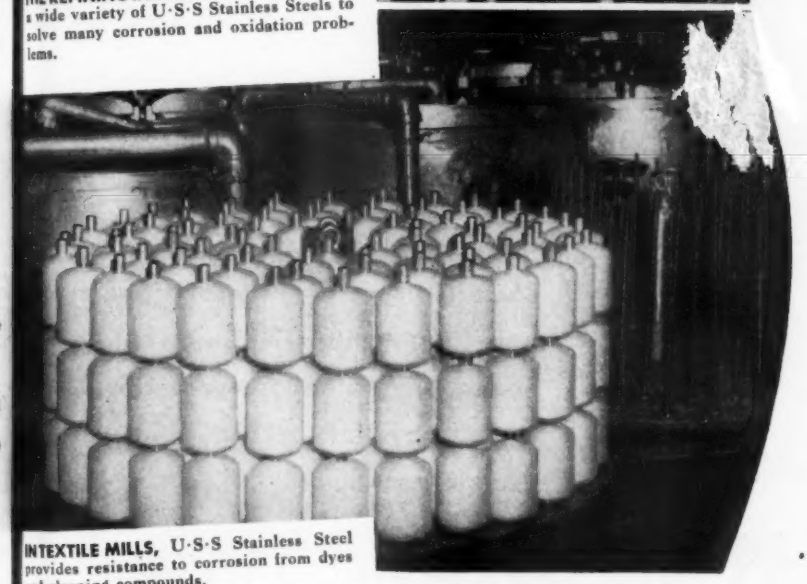
ARMY E NAVY

**WORKS AT**
**AMBRIDGE, PA.**
**CHICAGO, ILL.**
**NEWARK, N. J.**
**PUTNAM, CONN.**

**FOOD HANDLERS** find U·S·S Stainless Steel immune to food stains, rust and tarnish, easy to keep clean.



**THE REFINING INDUSTRY** may choose from a wide variety of U·S·S Stainless Steels to solve many corrosion and oxidation problems.



**INTEXTILE MILLS,** U·S·S Stainless Steel provides resistance to corrosion from dyes and cleaning compounds.

# LARGE STOCKS OF *Stainless Steel* AVAILABLE FOR IMMEDIATE SHIPMENT...

## *Call Us!*

CUTBACKS in military demands have permitted us to build up our warehouse stocks of U·S·S Stainless Steel. Sheets, plates, rounds, bars of all kinds, pipe, tubing, angles and welding electrodes in all standard grades and specifications are available for quick delivery.

### OUR ENGINEERS WILL HELP YOU!

War production has taught us hundreds of new ways to use Stainless Steel. This increased knowledge is at your service. Our engineers will gladly assist you in selecting the proper types of U·S·S Stainless Steel for your requirements and will help you with fabricating problems. Free technical bulletins will be sent to you upon request.

**PHONE, WRITE OR WIRE** our nearest warehouse when you need Stainless Steel. A call to us may help you solve a production problem, may speed reconversion to peacetime operations. We are doing our best, under today's conditions, to maintain our reputation for quick service. Your orders and inquiries will receive courteous attention and prompt action.

UNITED STATES STEEL SUPPLY COMPANY
USS
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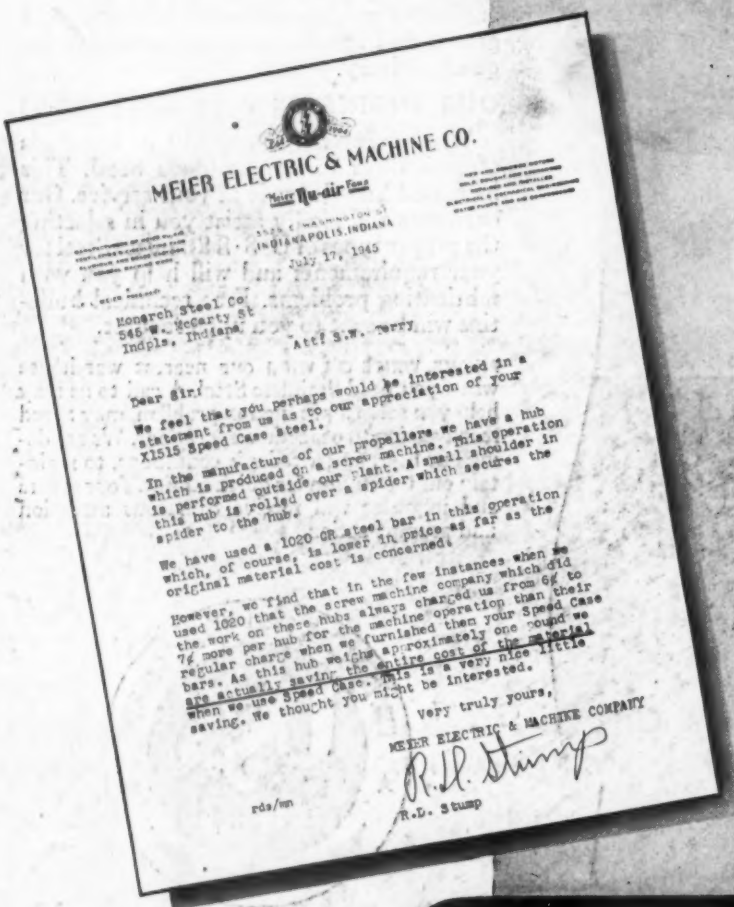
UNITED STATES STEEL

# Get your steel "*without cost*!"

**MEIER ELECTRIC & MACHINE CO., *of Indianapolis***
**REPORTS *SPEED CASE* STEEL SAVES ENOUGH IN PRODUCTION COSTS TO EQUAL THE COST OF THEIR COLD DRAWN BARS . . . .**



MEIER ELECTRIC & MACHINE CO.

Meier Nu-air Fans

INDIANAPOLIS, INDIANA

July 17, 1945

Monarch Steel Co
546 W. McCarty St
Indpls, Indiana

Attf S.W. Terry

Dear Sir:

We feel that you perhaps would be interested in a statement from us as to our appreciation of your X1515 Speed Case steel.

In the manufacture of our propellers we have a hub which is produced on a screw machine. This operation is performed outside our plant. A small shoulder in this hub is rolled over a spider which secures the spider to the hub.

We have used a 1020 CR steel bar in this operation which, of course, is lower in price as far as the original material cost is concerned.

However, we find that in the few instances when we used 1020 that the screw machine company which did the work on these hubs always charged us from 6¢ to 7¢ more per hub for the screw machine operation than their regular charge when we furnished them your Speed Case bars. As this hub weighs approximately one pound we are actually saving the entire cost of the material when we use Speed Case. This is a very nice little saving. We thought you might be interested.

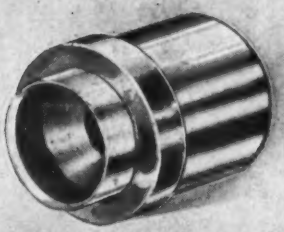
Very truly yours,

MEIER ELECTRIC & MACHINE COMPANY

R.D. Stump

rds/wn

R.D. Stump



## *This is the Part! Read the Facts!*

**(Shoulder on the propeller hub is rolled over a spider which secures spider to hub.)**

- **When using 1020 CR steel it costs from 6c to 7c *more* per hub for machining than when Speed Case Steel is used. This saving pays for the Speed Case used in each hub!**

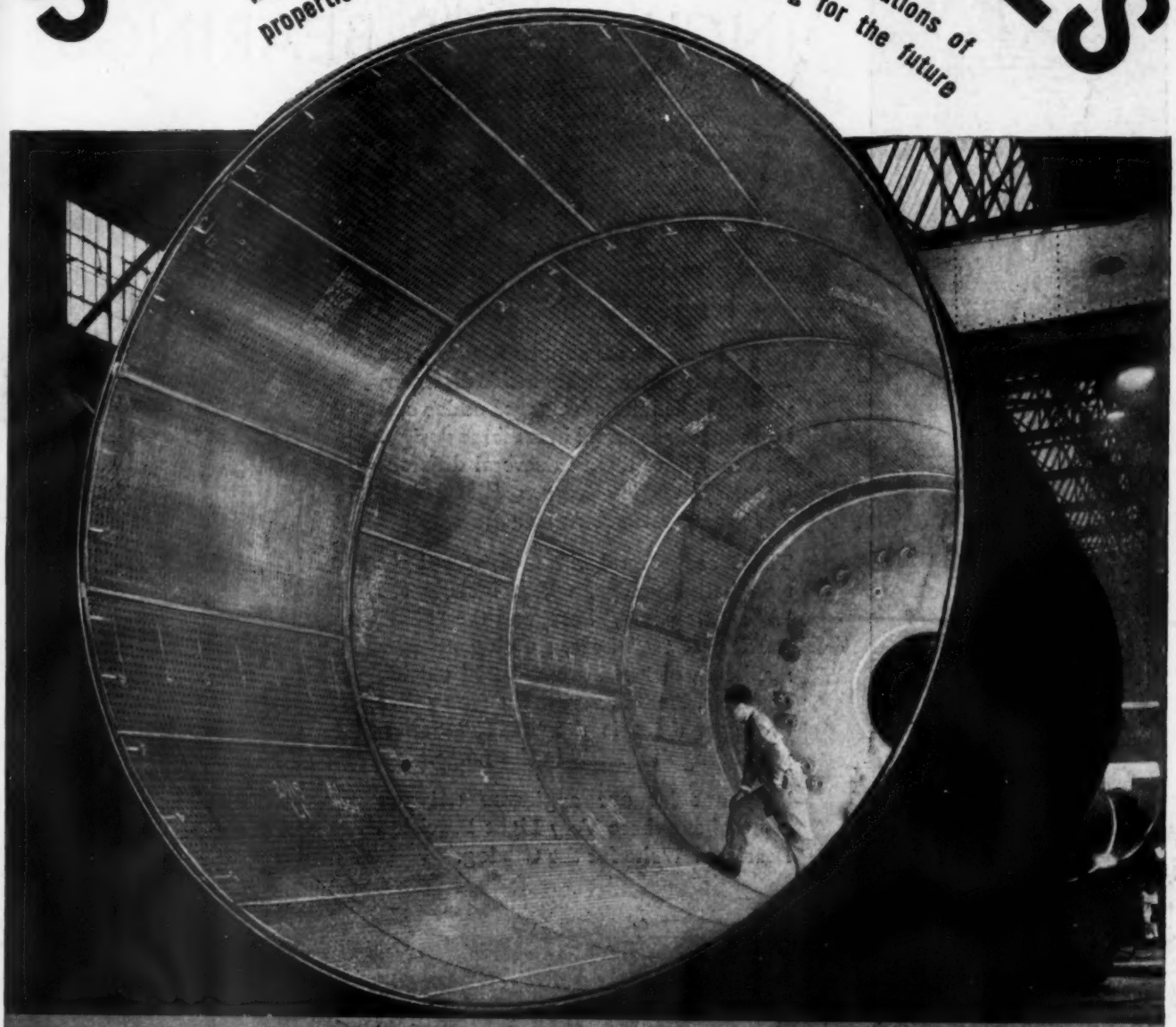
**Write for SPEED CASE and SPEED TREAT CATALOG**
***Our Metallurgists are at your service***

*Licensor*
**MONARCH STEEL COMPANY**
HAMMOND · INDIANAPOLIS · CHICAGO
PECKOVER'S LTD. Toronto, Canadian Distributor
MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

*Licensee for Eastern States*
**THE FITZSIMONS COMPANY**
YOUNGSTOWN, OHIO

# STAINLESS STEELS

**Most versatile of modern metals... their unique combinations of properties merit your consideration in designing for the future**



The commonly used chromium-Nickel type stainless steel that lines this fractionating column possesses natural immunity to rust and corrosion under virtually all oxidizing-acid conditions. Its resistance to creep, scale or oxidation at high temperatures assures long economical operation. Built by A. O. Smith Corporation, Milwaukee, this column, including the top section, exceeds 125' in length.

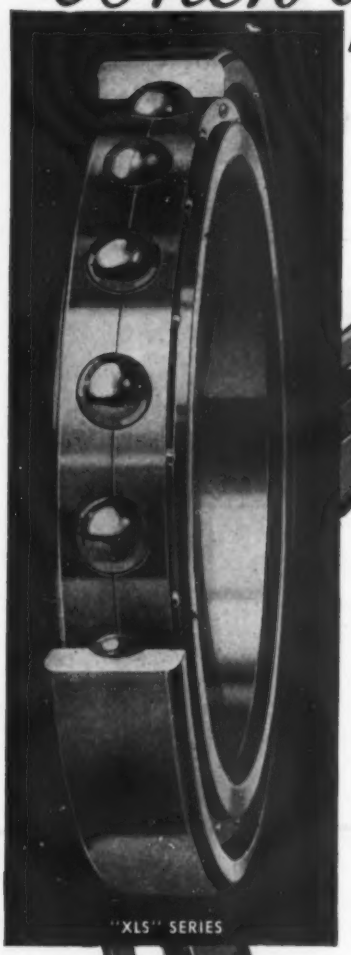
* * *

International Nickel are miners, smelters and refiners of Nickel, an important ingredient of the stainless steels, but do not produce stainless steels. If interested, please communicate with established sources of supply for stainless steels.

**THE INTERNATIONAL NICKEL COMPANY, INC.** 67 Wall Street New York 5, N. Y.

# *When You're Cramped for Space*

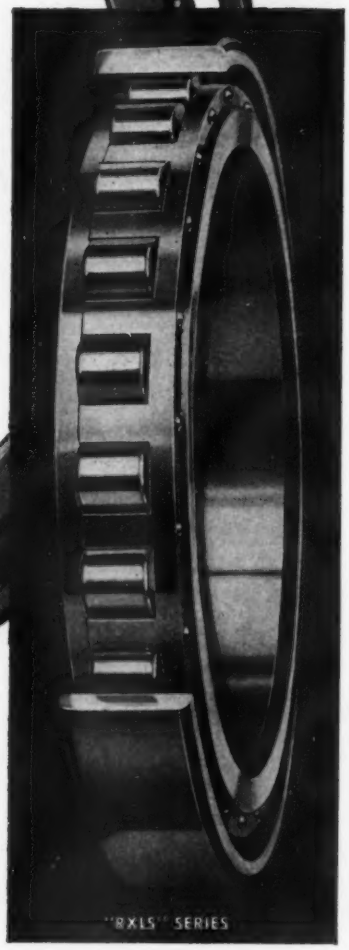
## USE THESE VERY LIGHT INCH SERIES BEARINGS




HAVING bores abnormally large, as compared with the outside diameter, they offer definite advantages under certain conditions found in machine design. You may have them in several different types, *affording compactness, light weight, and greater latitude in your design.*

There are several lines of very light type ball bearings, which include the "S" starting at 1/8" bore, and the "XLS" starting at 1 3/8" bore, running up to a maximum of 21" bore and 28" outside diameter. And in very light type roller bearings, there is the "RXLS" Series, paralleling the "XLS" in size range.

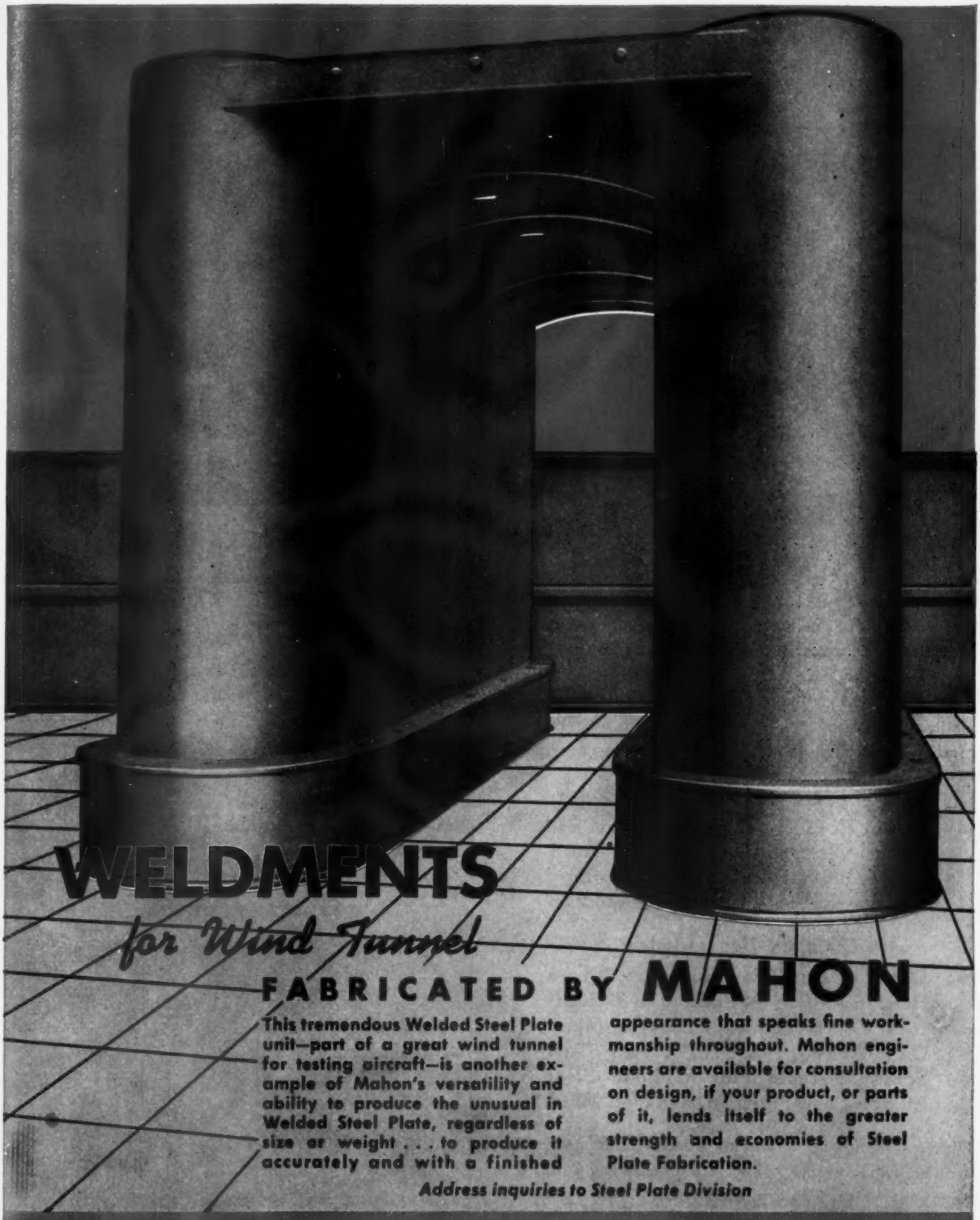
Why not let our engineers tell you more about these Very Light Precision Bearings? Write for the Catalog.




"NORMA-HOFFMANN"

PRECISION BALL, ROLLER AND THRUST BEARINGS

NORMA-HOFFMANN BEARINGS CORP'N.—STAMFORD, CONN., U. S. A.



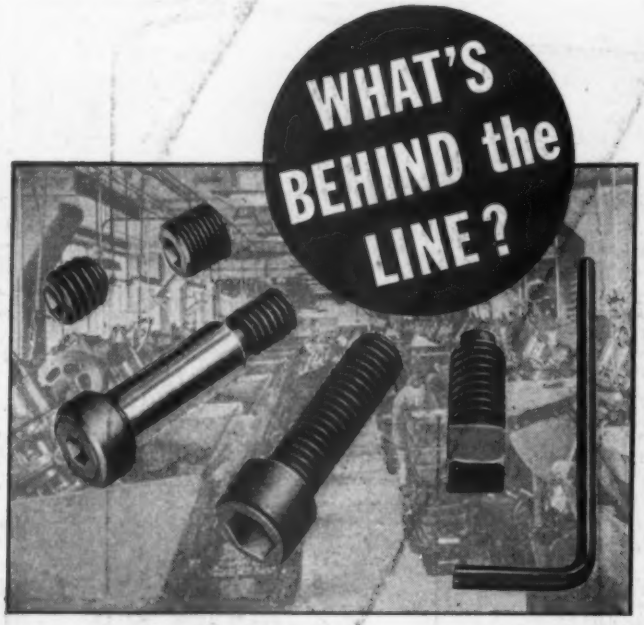
# WELDMENTS
## *for Wind Tunnel*
## FABRICATED BY MAHON

This tremendous Welded Steel Plate unit—part of a great wind tunnel for testing aircraft—is another example of Mahon's versatility and ability to produce the unusual in Welded Steel Plate, regardless of size or weight . . . to produce it accurately and with a finished appearance that speaks fine workmanship throughout. Mahon engineers are available for consultation on design, if your product, or parts of it, lends itself to the greater strength and economies of Steel Plate Fabrication.

*Address inquiries to Steel Plate Division*

THE R. C. MAHON COMPANY
DETROIT 11 CHICAGO 4

*Fabricators of Machine Bases and Frames and Many Other Welded Steel Plate Products*




# FINEST PRECISION EQUIPMENT

## Is Behind "Chicago Screw" Products

The facilities of The Chicago Screw Co. include the finest precision equipment, designed and built to maintain the very closest production tolerances. This modern machinery plus laboratory facilities plus the latest type automatic gauging devices, adds up to a uniformly accurate product ideally suited for quick, trouble-free assembly.

**Chicago "SAFETY PLUS" Line includes:**
Socket Head Cap Screws • Socket Set Screws • Stripper Bolts • Square Head Dog Point Set Screws • Socket Pipe Plugs • Keys for Socket Screw Products.

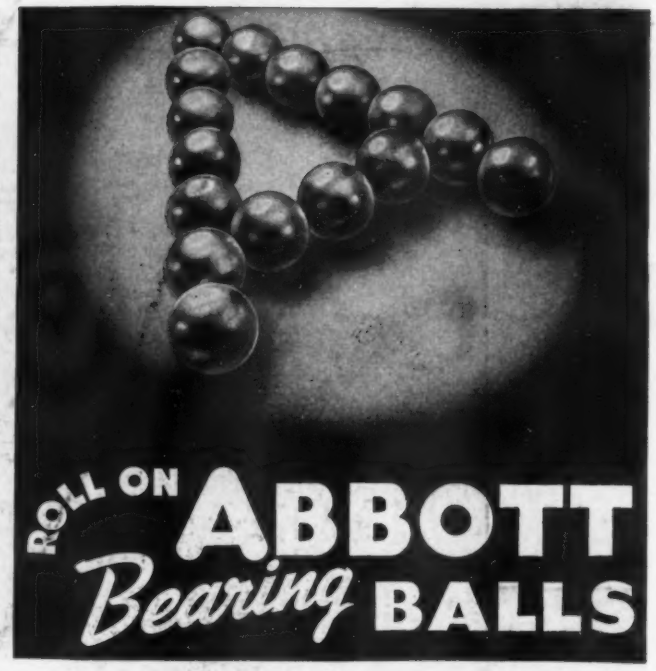
**Complete Line includes:**
Hexagon Head Cap Screws • Square Head Cup Point Set Screws • Headless Set Screws • Fillister Head Cap Screws • Flat Head Cap Screws • Taper Pins • Milled Steel Studs • Semi-Finished Hexagon Nuts.

On your future requirements, specify Chicago Standard Screw Products. They are unsurpassed for the needs for which they are made.

ARMY E NAVY

*These Fine Products are sold only thru Authorized Distributors*

THE CHICAGO SCREW CO.
ESTABLISHED 1872
1026 So. Homan Avenue Chicago 24, Ill.



ROLL ON ABBOTT *Bearing* BALLS

## *Their "Built-in" STAMINA assures UNINTERRUPTED PERFORMANCE*

*SPECIFY "ABBOTT" and be sure*
THE ABBOTT BALL COMPANY
HARTFORD 10 CONN., U. S. A.

It's a question of
BALANCE

The long trouble-free life and minimum maintenance expense of Ruthman Gusher Coolant Pumps is due to their precision balance. The entire rotating assembly of Ruthman Pump is electronically balanced, assuring alignment and vibrationless rigidity of the one piece shaft.

If you prefer a longer lived pump specify Ruthman Gusher Coolant Pumps for your machines.

THE RUTHMAN MACHINERY CO.
1813 READING ROAD
CINCINNATI 2, OHIO
The "GUSHER"—A Modern Pump For Modern Machine Tools

**There's a Gusher for Every Coolant Requirement**
***Write Us Now for a Catalog.***

# PROTECT AIR TOOLS FOR *LASTING* EFFICIENCY!

Retain the brilliant performance built into your air driven tools and cylinders. Protect them with positive, continuous, air-borne lubrication. Get peak performance straight thru—with minimum maintenance. *Norgren Lubricators* are your sure guarantee of such results.

Norgren Lubricators supply exactly the right amount of clean, fresh oil to all moving parts of the air tool or cylinder—for power-packed performance while the tool is operating—for positive protection against rust and corrosion while tool is idle.

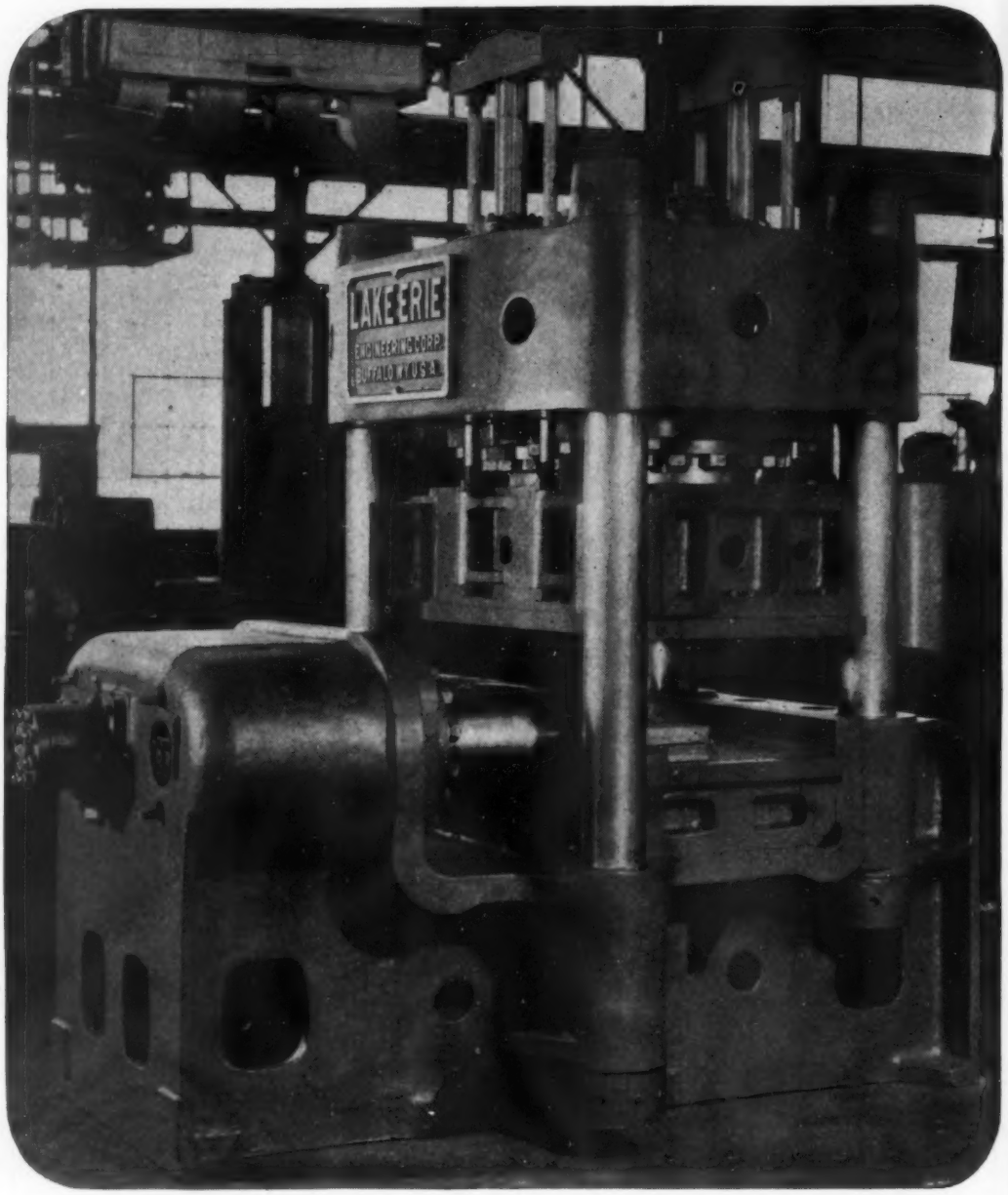
With Norgren Lubricators you can't forget vital lubrication—it's automatic. The lubricator runs only when the tool is operating. Responds instantly when air-flow starts. You need not turn it on; you cannot forget to turn it off.

**WRITE FOR COMPLETE INFORMATION**
**C. A. NORGREN COMPANY, 228 SANTA FE DRIVE, DENVER (9), COLORADO**

*Norgren*

*CASE HISTORIES PROVING THE POWER OF THE PRESS*

# Another Lake Erie contribution to better compression molding



This 450-ton Lake Erie angle molding press was designed and built to meet the customer's specific requirements. It is used by a large electrical manufacturing company for molding phenolic material.

Lake Erie has a thorough knowledge of all types and sizes of hydraulic presses required by the rapidly growing plastics industry. Already we have designed standard compression molding presses that can be adapted to your needs —or we can build presses to meet any special production methods you may require. Write for complete information.

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OFFICES IN PRINCIPAL CITIES
UNITED STATES AND FOREIGN COUNTRIES

**LAKE ERIE**
**ENGINEERING CORP.**
**BUFFALO, N.Y. U.S.A.**

# MACHINING DATA ON PLASTICS

## 10. MACHINE ENGRAVING

(PART THREE OF THREE PARTS)

*This is the tenth in a series of messages designed to better your knowledge of the phenolics —the most versatile of all plastics . . . the type of plastics which Durez has specialized in producing for the past quarter century.*

Because the cost of machine engraving runs higher than other methods of marking, it is only used occasionally. However, there are certain definite applications such as precision work calling for close dimensional accuracy, where it is very necessary.

### Special Engraving Machine

The machine engraving of molded phenolic plastic parts is accomplished by means of a mechanical arrangement on an accurate precision built machine using rotary cutters. These machines are equipped with adjustable pantographic ratios.

For engraving numerals, lettering, or specially designed monograms, an enlarged master template is set up in the tracer holder. The tracer on the pantographic arm is followed or guided around the template causing the cutter to follow the same form and reproducing the desired engraving in a reduced size.

High speed steel cutting tools can be used for small quantities of general-purpose, cotton- or rag-filled plastic materials. However, tungsten carbide tipped tools are most satisfactory, especially on mineral-filled materials which are of an abrasive nature.

### Cutter Speeds

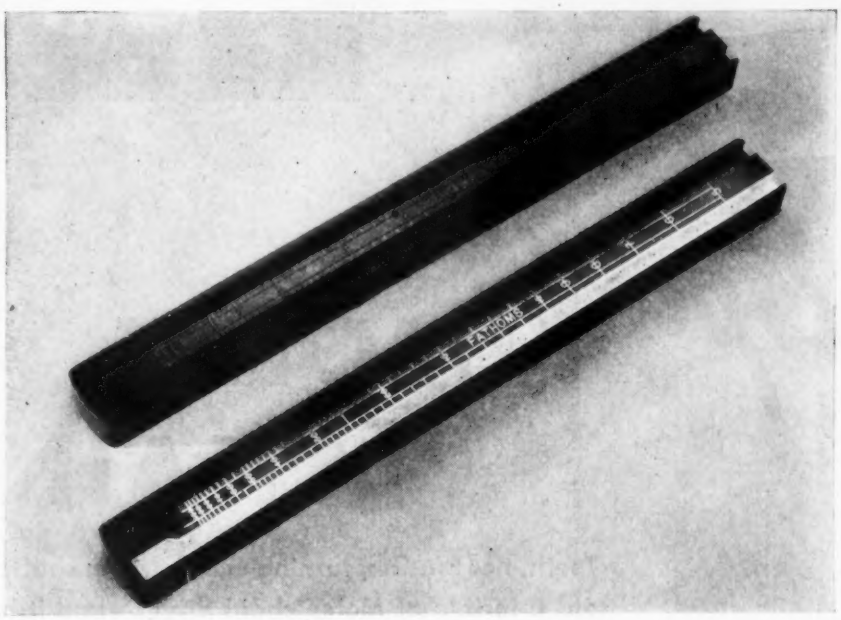
In all cases, the cutter should be operated at the maximum possible speed. The recommended peripheral speed for phenolic materials is 300 to 600 feet per minute.

### Colored Lettering

The filling of depressed lettering to obtain contrasting colors is accomplished by means of brushing lacquer or paint into the depressions. In doing this, a certain amount of paint will be deposited on the surrounding surface of the molded part. This, however, may be removed with very little difficulty by semi-drying the paint and wiping the high surface with a cloth saturated with a suitable solvent. To obtain a superior lustrous finish, this surface may be polished on a *clean* buffing wheel.

### Valuable Assistance Available

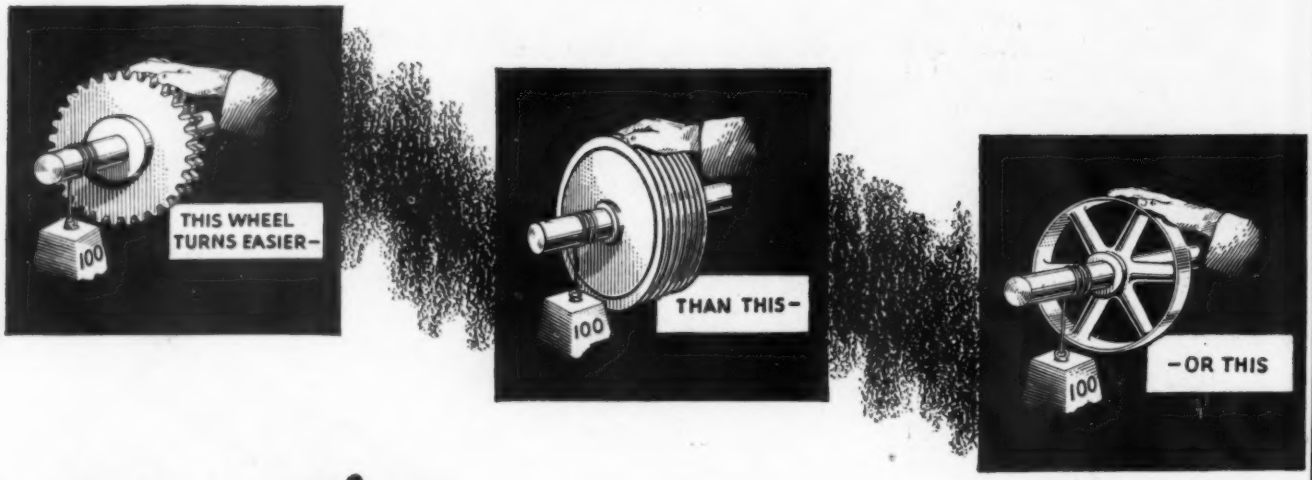
The benefits of the vast experience which Durez technicians have acquired during the past quarter century are available at all times towards furthering your progress in the machining and finishing of phenolic plastics. Durez Plastics & Chemicals, Inc., 5310 Walck Road, North Tonawanda, N. Y.




*This before and after photo illustrates a molded Durez "Fathom Meter" in which depressed graduations and lettering have been molded and filled with white paint.*

DUREZ
PHENOLIC RESINS
MOLDING COMPOUNDS
INDUSTRIAL RESINS
OIL SOLUBLE RESINS
PLASTICS THAT FIT THE JOB

# NO SLIP...
# NO WASTED POWER!




## *Specify* MORSE CHAIN DRIVES

**Teeth, not tension, turning chain-driven shafts, is the 50-year-old principle of Morse chain drives—and it has proved itself in tens of thousands of applications in a multitude of industries. For maximum, uniform power transmission at low cost—call in your Morse engineer! MORSE CHAIN COMPANY, Ithaca, N. Y., Detroit, Mich.**

SPROCKETS CHAINS FLEXIBLE COUPLINGS CLUTCHES

**MORSE *Roller and Silent* CHAINS**

MORSE CHAIN COMPANY • ITHACA, N.Y. • DETROIT 8, MICH. • A BORG-WARNER INDUSTRY

# "Pipelines that flex" for OIL . . . STEAM . . . GAS

A few of the many American Flexible Metal Hose and Tubing assemblies engineered complete with fittings or couplings for specific applications.

VIBRATION or continual movement in a connection is bound to cause trouble sooner or later . . . unless the connection is *engineered* for the job.

Illustrated are a few American Flexible Metal Hose and Seamless Tubing assemblies, each of which *is* designed to meet a specific set of conditions.

Such a connection can be developed for you . . . with the necessary resistance to pressure, temperature, chemical or abrasive action and mechanical stress.

For detailed information on the range of types and sizes of "American" products, write for Publication SS-50. Manufacturers, engineers and machine designers alike will find it a thoroughly practical guide.

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# CLUTCH USERS...

## HERE'S THE MAXITORQ *in detail*

NO TOOLS NEEDED FOR ASSEMBLY • ADJUSTMENT OR TAKE-APART

This exploded view photograph shows ALL parts of a MAXITORQ Floating Disc Single Clutch . . . in the correct order of assembly which is made by HAND . . . and securely locked without the use of tools.

The patented Separator Springs (fourth part from top) are inserted between each disc so that they ride free in neutral. Thus there can be no drag, no abrasion, no heating. "In" and "out" are positive . . . disengagement is instantly made with light pressure.

We have made nothing but clutches for 50 years . . . good ones always . . . but the MAXITORQ has taken machine tool manufacturers by storm . . . has been enthusiastically received by makers of all sorts of special machinery . . . and is doing a wonderful job on countless machines and instruments.

For fast power pick-up, smooth, quiet operation, easy adjustment to proper tension and long clutch life, specify MAXITORQ. Send for new Catalog No. A101.

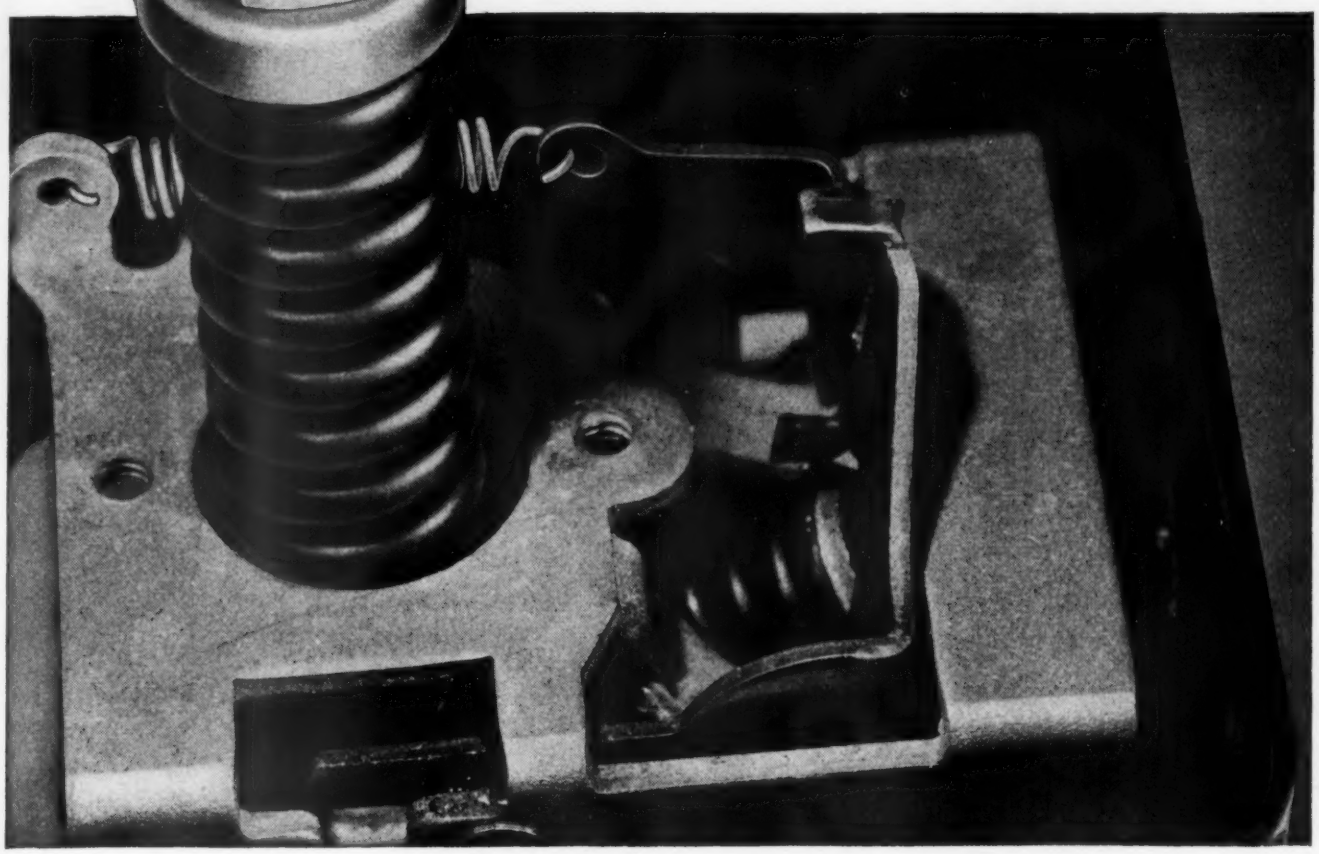
**TYPES . . . CAPACITIES**

Maxitorq clutches are made in Single and Double types, wet or dry. Pulley & Cut-off Coupling Types also available. Capacities from ¼ to 15 H.P. at 100 r.p.m.

***Territories open to Established Manufacturer's Agents capable of developing power transmission installations. Full cooperation and leads.***

**THE CARLYLE JOHNSON MACHINE CO.** MANCHESTER, CONNECTICUT

# A NUT BELONGS *where you put it!*



## THE ELASTIC *Self-locking* STOP NUT HOLDS FAST

Like a sentry on post, the red collar nut never wavers in its duty. It stays where it's put.

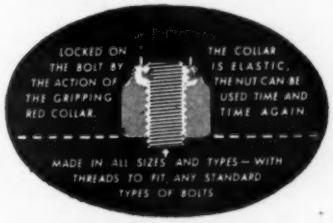
This is especially important in mechanical assemblies where spring tension or compression devices are designed to hold fine adjustments. At best, the "creeping" of an ordinary nut means continual servicing for readjustments. At worst, it means poor operation or complete breakdown.

But the Elastic Stop Nut, the one with the famous red collar, never backs off, whether it is "seated" against a surface or unseated on a threaded part. Only a deliberate effort with a wrench will remove it, yet that removal is sure and simple because the famed red collar seals off dirt and corrosion from the bolt.

It is the red collar that overcomes the effects of vibration, shock and impact —the precise forces that make ordinary nuts fail. The collar in the head of the Elastic Stop Nut is tough and strong. It is unthreaded and gauged slightly smaller than the bolt. Bolt threads force their way in, do not cut. The result is a two-sided friction grip that holds firmly. And because the collar is resilient, the Elastic Stop Nut may be used over and over again.

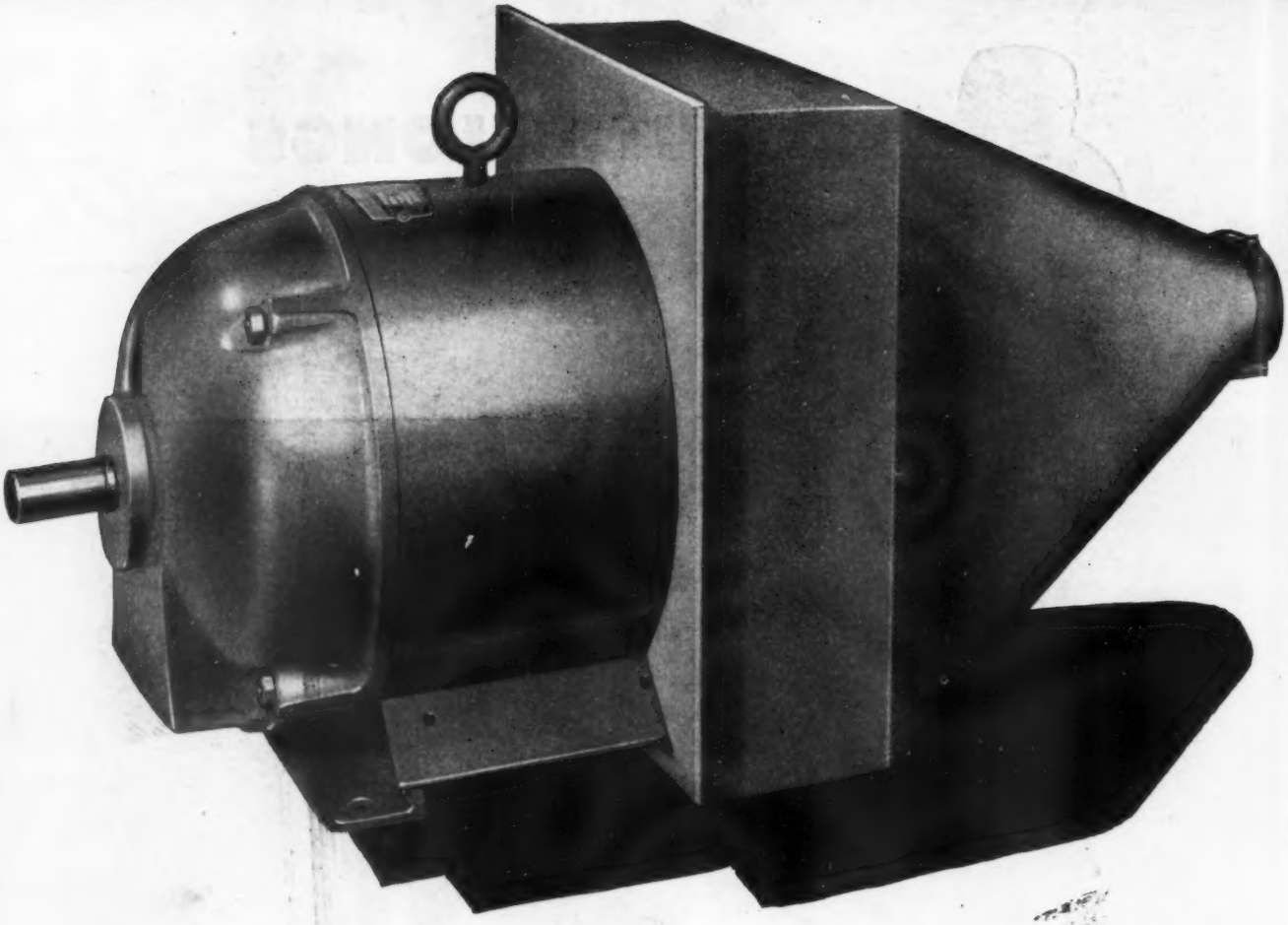
Perhaps you are having difficulty with nut-and-bolt fastenings caused by loose nuts. Let an Elastic Stop Nut engineer call on you. Just write us.

LOOK FOR THE RED COLLAR
THE SYMBOL OF SECURITY


LOCKED ON THE BOLT BY THE ACTION OF THE GRIPPING RED COLLAR.
THE COLLAR IS ELASTIC. THE NUT CAN BE USED TIME AND TIME AGAIN.
MADE IN ALL SIZES AND TYPES—WITH THREADS TO FIT ANY STANDARD TYPES OF BOLTS

**ESNA**
TRADE MARK

**ELASTIC STOP NUT CORPORATION OF AMERICA**
Union, New Jersey



# This motor's in the "doghouse" so YOU can stay out!

Even under normal conditions, many motors must be placed close to walls or surrounded with equipment which reduces the free flow of air. With today's motor-relocation problems facing so many manufacturers, the chances of motor overheating are often multiplied.

To help you beat the heat on motors that must be mounted in close quarters, R & M engineers put all newly designed Uni-Shell Motors through the "doghouse" test. Here, the air flow produced by the fans within these motors is directed through the cone-shaped box and measured. How well the fan controls temperature rise depends on fan design, location, and the shape of motor housing openings through which the air must pass.

To evaluate these factors, to build up a background of fan efficiency, to make certain that you can't go wrong with Uni-Shell Motors for operation in high-temperature or poorly ventilated areas, is the purpose of the "doghouse" test.

If you have a motor problem (be it one of overheating or any other) let R & M engineers help you solve it.

**FREE NEW BOOKLETS!**

"SHADED POLE MOTORS," Form No. 1887. "MATCHED MOTOR PARTS," Form No. 1871. "UNI-SHELL INTEGRAL H.P. MOTORS," Form No. 1845. "MOTOR GENERATOR SETS," Form No. 1881.

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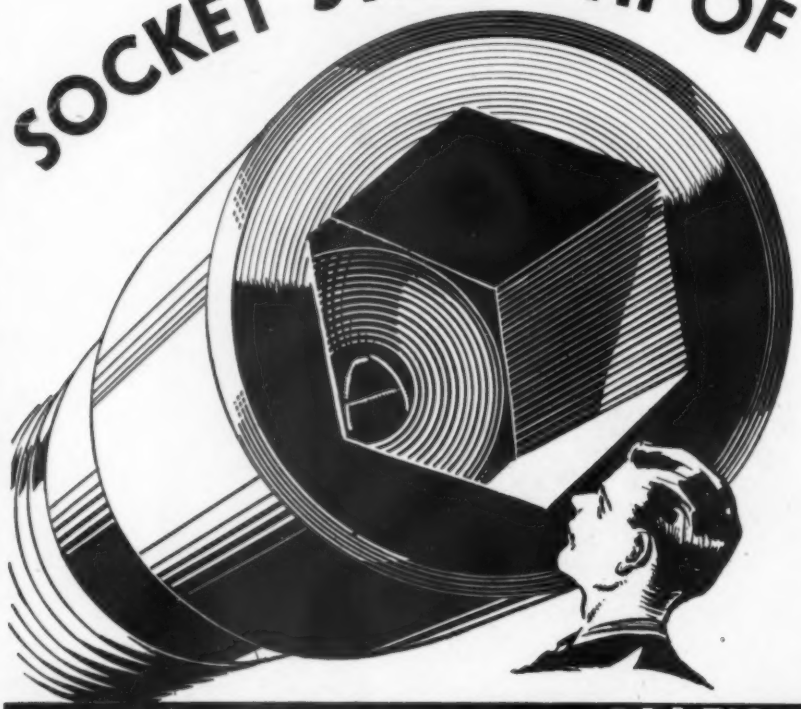
26

# Look into the SOCKET STRENGTH OF ALLEN

## SOCKET HEAD CAP SCREWS



Note the true, sharp outlines of socket walls,—so accurately shaped that the hexagon key bears evenly and equally on all surfaces. So the key snugly "bottoms" in the hole; no rocking, no wrench-play.

Could you see through into the metal structure you would find that the steel-fibres conform to the shape of the head. Formerly and by other processes, the steel-fibres were cut under the head, weakening the socket-head at the very focus of torsional and right-angle strain.

Add to these features for powerful set-ups the HOLDING-POWER of precision *pressur-formd* threads, accurate to a high Class 3 fit. . . Then call your local Allen Distributor who has the *only* line of socket screws that incorporates all these strong-points.

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When it's a matter of product engineering, you will find Felt, as developed by "Western Felt" to be an extremely versatile material . . . New uses are being found daily . . . It may be your answer to many parts specifications . . . It cuts readily to any form —and does not ravel, fray or lose its shape.

Western Felt—ranging from wool soft to rock hard—is resilient, flexible, compressible, resistant to water, age, heat, oil . . . and can be processed to extremely close tolerances. If these characteristics match your needs let a Western engineer check Felt's potential applications to your products.

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Remarkably small and compact in size, Tuthill Model L pumps do a man-sized job in pressure lubrication service. These internal-gear rotary pumps feature the patented Tuthill mechanical seal. They are equally outstanding for hydraulic applications, fuel oil and liquid transfer. Capacities from .33 to 3 g.p.m. at pressures up to 400 p.s.i. Ring or foot-mounted. Many porting arrangements available. Write for Model L Industrial Bulletin.

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# UALITY CONTROLLED TO THE LAST HREAD

From billet to the final threading, the processing of every circle Ⓑ bolt and fastener is controlled in one plant—the largest integrated independent in the country. This accounts for the uniform dependability and accuracy of Buffalo Bolt Products.

## BUFFALO BOLT COMPANY

NORTH TONAWANDA, NEW YORK
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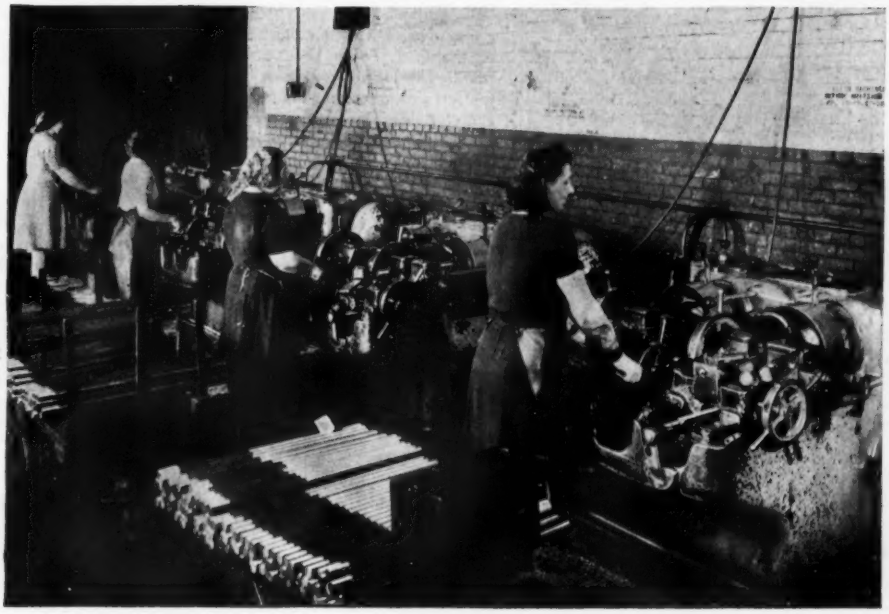


A few of Buffalo Bolt Company's modern threading machines.

# *Cut Peacetime Fastening Costs*

## WITH THIS WARTIME SPEED METHOD!

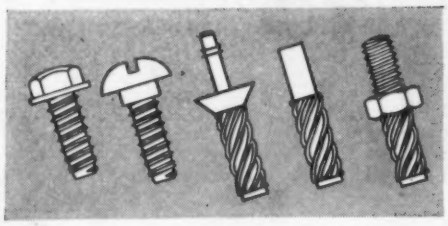
Holding production costs to a minimum is one of today's major reconversion problems . . . and just as P-K Self-tapping Screws proved the fastest and most economical way to make secure metal or plastic assemblies during wartime, they will help you keep peacetime production costs at a profitable level.

For a large percentage of fastening jobs P-K Self-tapping Screws offer a combination of ease, speed and security unmatched by any other fastening device or method. One easy operation makes a strong fastening with Self-tapping Screws . . . merely drive the Screws into plain, untapped holes. They eliminate the need for metal inserts – awkward riveting – and the fumbling that goes with handling bolts, nuts and lock-washers.

**P-K SCREWS INCREASE EFFICIENCY OF BURGLAR-PROOF PADLOCK**

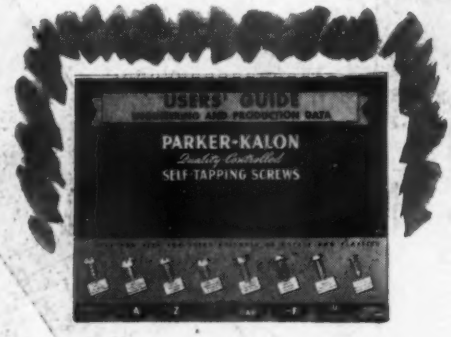
This padlock represents some clever design work on the part of the E. T. Fraim Lock Company. The long drive screw on the left side goes into the brass cylinder sleeve, securely attaching it to the casing; the center drive screw goes into the hole in the sleeve for lock assembly purposes only; and the one on the far right side serves as a cover for the shackle stop pin. Nearly 3,000,000 specially designed P-K Screws have been used in the production of this padlock to date.

***Sold Only Through Recognized Distributors***



**FUNCTIONAL, TOO!** Parker-Kalon is equipped to produce P-K Self-tapping Screws in special forms so they may also be used *functionally* . . . as feet – as locking devices – as stops for springs – as retainers for bearings – as pivot pins – as shafts – as plugs for holes – and for scores of other special purposes.

**A P-K ASSEMBLY ENGINEER WILL HELP YOU** improve product quality, speed work and save money. He is a specialist in all types of plastic and metal fastenings and will be glad to visit your plant and work with you in searching out ALL opportunities for utilizing Self-tapping Screws. Or, you can mail assembly details direct to us for recommendations.




**WRITE** for P-K's free "Users' Guide". It is crammed with helpful information regarding where and how you can use P-K Self-tapping Screws most effectively. Address: Parker-Kalon Corporation, 208 Varick St., New York 14, New York.

# PARKER-KALON
## Quality-Controlled
## SELF-TAPPING SCREWS

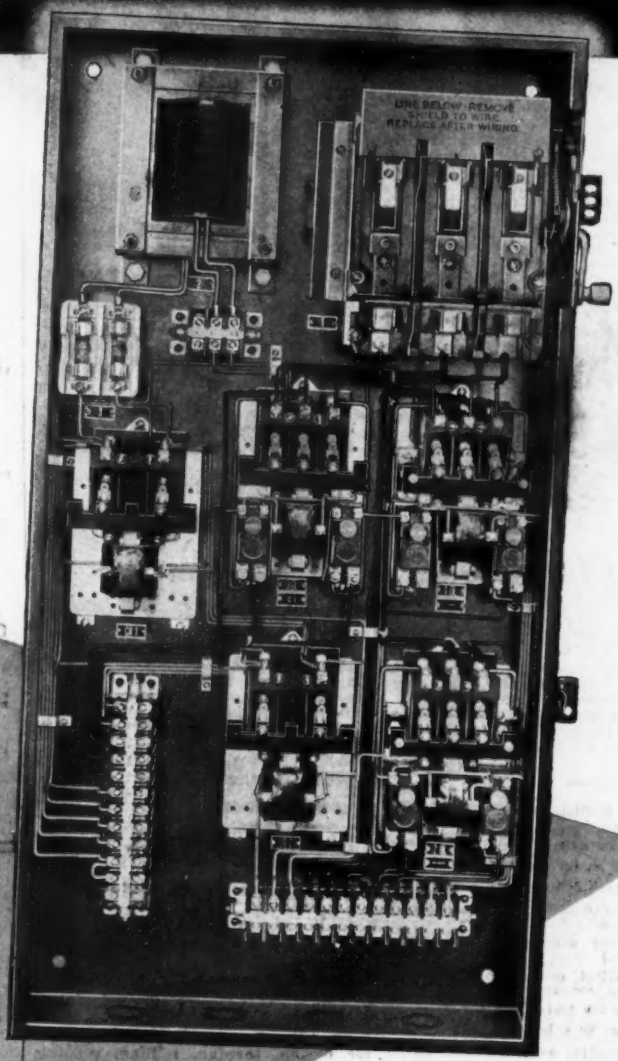
**For Every Metal and Plastic Assembly**

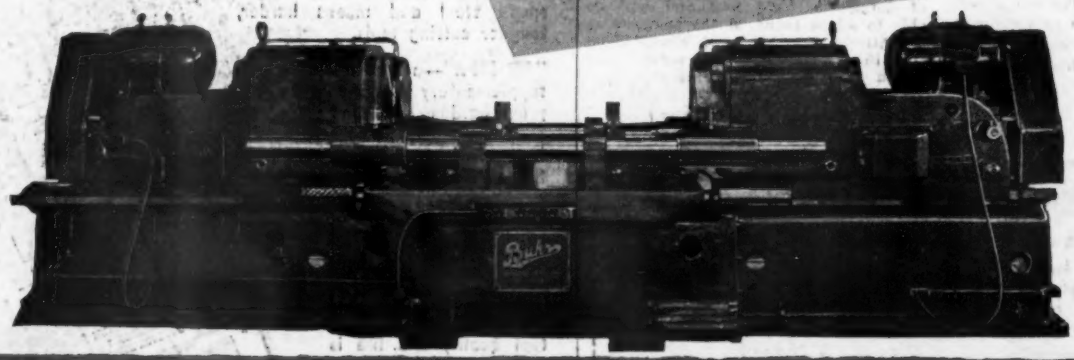
# "3C" CONTROLS HELP THIS BUHR MACHINE COMBINE OPERATIONS TO SAVE TIME

THE standard boring machine drills one end of a piece at a time. When the other end requires drilling, work must be removed, turned around, re-set and re-centered. The Buhr Horizontal Two-Way Machine illustrated below has the unique advantage of working on both ends at once, thus eliminating handling and saving time. It has been an important factor in speeding the production of Trunnion Tubes for Tanks, on which it bores 6.875" holes 10" deep on both ends in one operation.

The "3C" Control Panel (illustrated at the right) has all control apparatus in one cabinet, making a neat, compact installation; easily inspected and maintained. It provides control for two 5 H. P. Head Motors, one 1¼ H. P. Coolant Motor and 4 Solenoid Valves. These are all operated from a row of "3C" Type D Push Buttons, conveniently located directly under the operator's hands on the front of the machine. (See illustration).

*Clark specializes in controls for modern, high speed machine tools. Let Clark engineers help you design the proper controls for your equipment.*





**THE CLARK CONTROLLER CO.**

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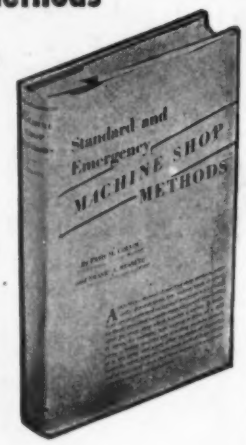
## Ingenious machine tool methods to help you get more from your shop equipment

—to cut down idle time of machines

—to increase your productive capacity and profits




This manual of machine tool methods gives both standard practice and also many ingenious substitute uses developed to meet war production emergencies. It covers many different jobs in turning, boring, and other operations, giving full details of actual cases in which time and trouble, and even complete hold-up of production, was avoided by applying machines to jobs they were not intended to handle.

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# STANDARD and EMERGENCY MACHINE-SHOP METHODS

*By* FRED H. COLVIN
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333 pages, 5½x8½, fully illustrated, $3.50

Here is a mine of ideas for any machinist, in devising methods for handling difficult or unusual jobs. More than this, by showing scores of usable and adaptable ideas for using machines in different ways, the book gives invaluable aid to the shop owner and operator in saving production time when the normal machine for the job is laid up, busy, or otherwise not available, and in profitably increasing the variety of work handled by his shop.

**Look up—**

—using multiple tools
—building special machines from standard units
—boring on the radial drill
—mounting drills upside down
—using weights for feeding spot-facing tool
—turntable fixture made from old flywheel
—improvised drilling machine for marine stern-tube liners
—emergency boring fixtures
—milling on a boring machine
—gear cutting on a horizontal boring machine
—grinding a taper hole with a flexible-shaft machine
—unusual jobs on the gear shaper
—cutting large gears on a slotter
—profiling by broaching
—metal sawing by frictional heat—and many others

**8 sections packed with practical ideas—**

1. Standard Machine Tools
2. Standard Methods and Machines
3. Making Holes
4. Boring Machines and Boring Mills
5. Lathe Work
6. Milling Practice
7. Planing, Slotting, Shaping, and Machine Forging
8. Grinding Operations

**See it on approval**

With the scores and scores of ideas for boring, turning, milling, planing, grinding, and other jobs at hand for reference, every one from the boss down to the apprentice will find ways of doing the hard jobs and will be able to adapt many of the suggestions to entirely new kinds of work. Send for this valuable book today, and widen your field of operations.

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# Send for

The facts outlined in this booklet are taken from hundreds of actual cases showing the surprising variety of tools which can be improved by modern treatments. Among the several processes mentioned are: **"SILVER FINISH"**—which is clean, bright hardening . . . no oxidization or scale.

**"NUSITE"**—starts with soft high-speed steel and means harder, tougher cutting tools.

**"AD-LIFE"**—a combination of supplementary treatments to improve hardened finished tools . . . even new ones . . . no rehardening is required . . . no danger of fracture or distortion.

What manufacturers of tools, air planes, trucks, gears, steel molds, food machinery, electrical devices, and many other fields did to improve tool quality and life is told.

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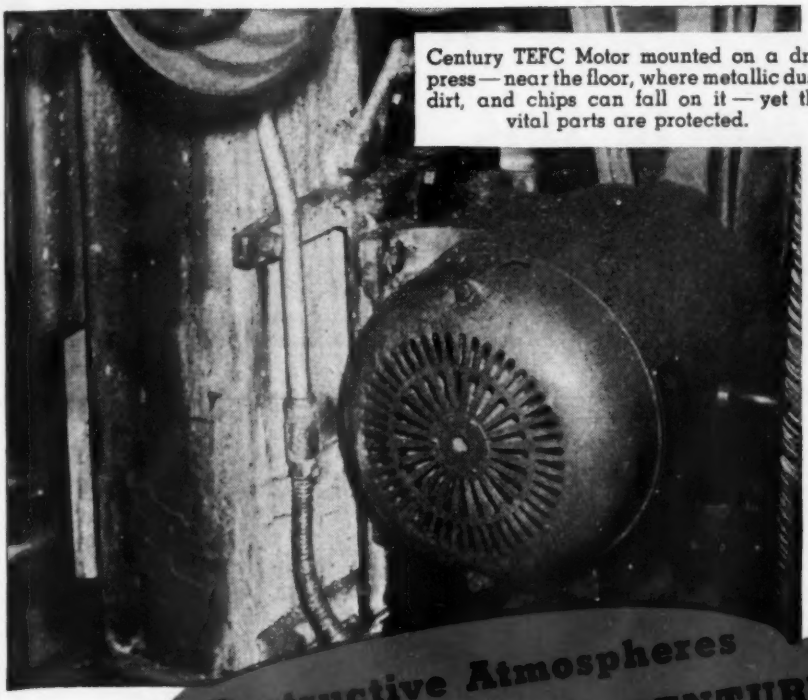
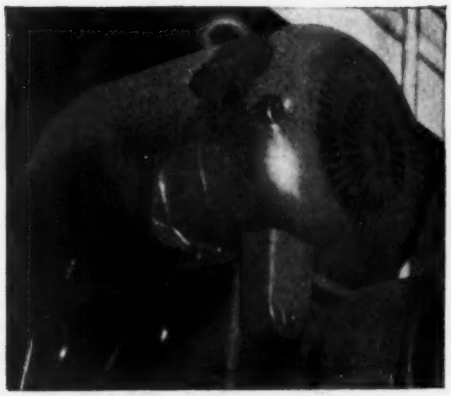
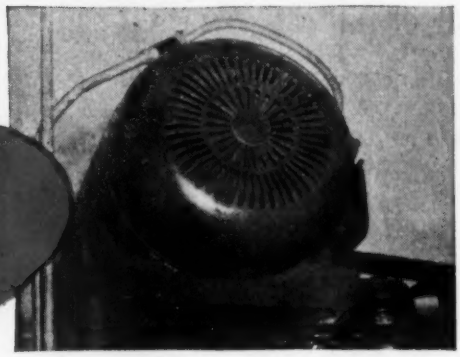


Century TEFC Motor mounted on a drill press — near the floor, where metallic dust, dirt, and chips can fall on it — yet the vital parts are protected.



Century TEFC Motor mounted on a milling machine. Dirt on outside of fanguard is result of operation where air contains metallic dust and coolant spray.



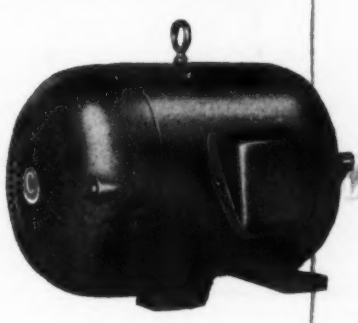
Century TEFC Motor mounted high on top of a boring machine. It's out of reach and probably gets little attention, yet protected against coolant mists and oil-laden dusts by Century TEFC design.

# Destructive Atmospheres Require the Protection of CENTURY TOTALLY ENCLOSED FAN COOLED MOTORS!

The illustrations of Century TEFC Motors in use shown here are typical examples of machines on which these motors can maintain production despite adverse atmospheric conditions. Where the air is charged with substantial quantities of metallic or abrasive dusts, coolant mists, or oil-laden factory dusts, Century TEFC Motors give the protection that means constant uninterrupted production.

The vital parts of the motor are isolated from the outside atmosphere by a sealed inner frame. A large fan blows a blast of cooling air around the frame and the bearings — to keep the motor temperature well within safe operating limits.

For maximum protection that will keep your machines on the job, get all the facts about Century Totally Enclosed Fan Cooled Motors. Call in a Century engineer; he may be of assistance.



Century Totally Enclosed Fan Cooled Motor with the heavy, pressed steel fan cover removed.

Century Totally Enclosed Fan Cooled Motor End Bracket.

Century Totally Enclosed Fan Cooled Motor Frame and field winding showing the air passages.

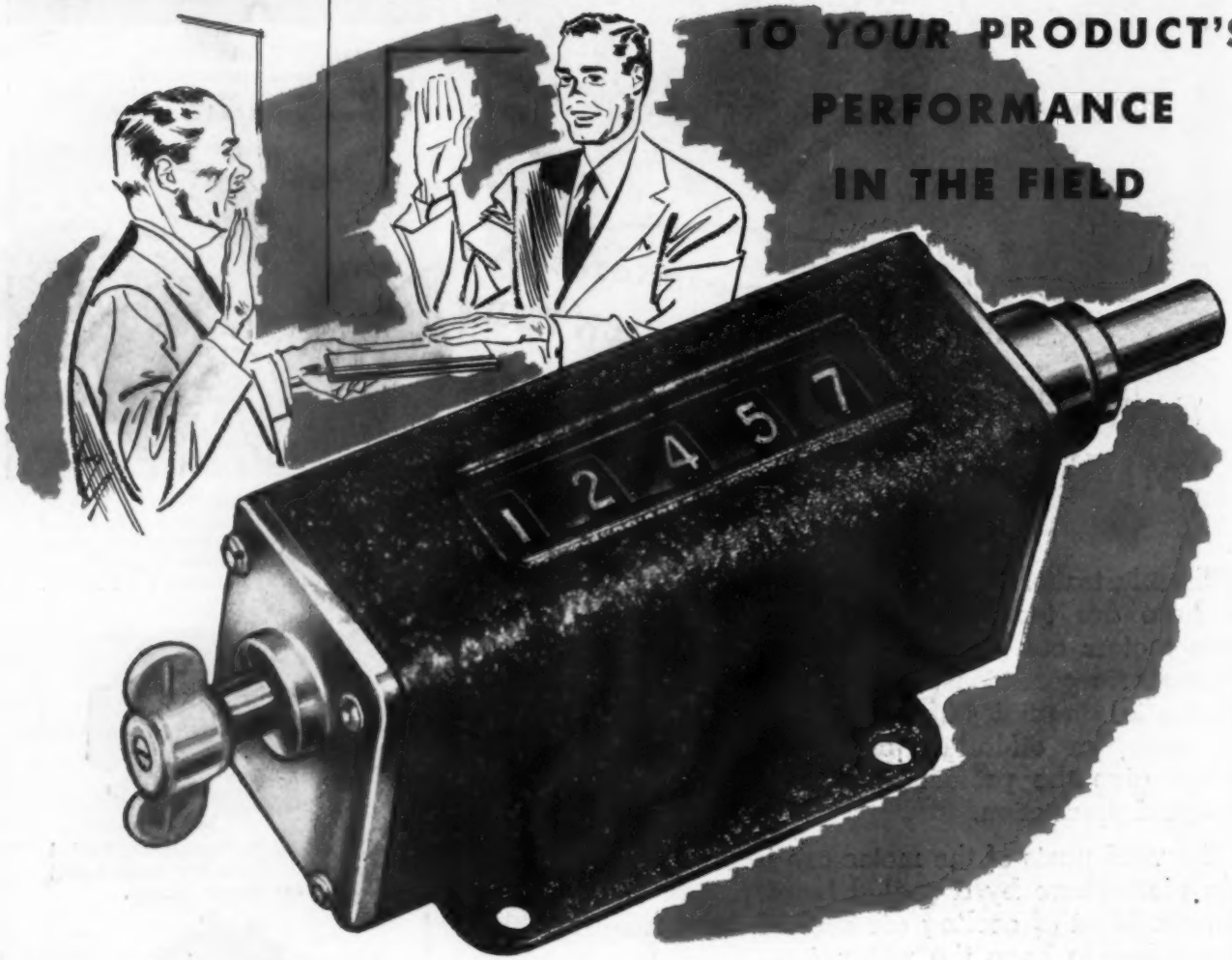
**CENTURY ELECTRIC COMPANY**

1806 Pine St. • St. Louis 3, Mo.

*Offices and Stock Points in Principal Cities*

434

# Build
# ~~Swear~~ in this
# SILENT WITNESS
## TO YOUR PRODUCT'S PERFORMANCE IN THE FIELD




WHERE'S YOUR PROOF . . . if one of your customers claims your product falls short of its performance guarantee?

*HERE'S* YOUR PROOF . . . in plain, bold, black-and-white figures on the face of a Veeder-Root Counting Device . . . *built into your product* as an integral feature of design.

For this Veeder-Root Counter, having begun to count the instant your product went into operation, presents at any time a complete, up-to-the-minute record of performance in terms of strokes, turns, pieces, trips, weights, volumes . . . or many other units of performance.

Veeder-Root Counters can be built-in, without causing basic changes in product design. Their drive connections are simple. There are types for either mechanical or electrical operation. And they can be built-in so that any would-be tamperer will have a run for his money . . . and will be bound to leave evidence behind him.

You can avoid arguments, prevent losses, build reputation, keep friends . . . all through built-in Veeder-Root *Counr*ol. Not forgetting that you'll be doing your customers an extra service by letting them *see* that they are getting out of your product all the performance which you put into it. Write.

*The Counting House of Industry*

**VEEDER-ROOT INC.**

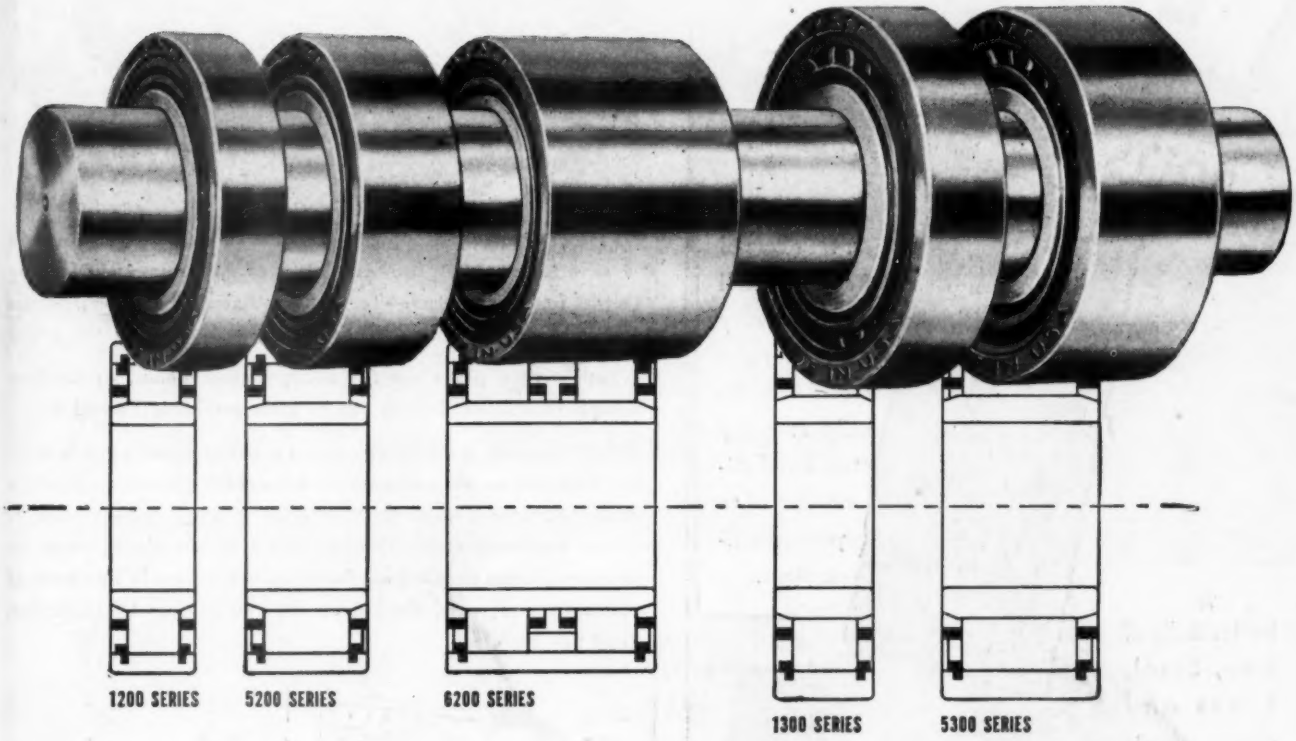
***Hartford 2, Connecticut***

*In Canada:* Veeder-Root of Canada, Ltd., Montreal
*In England:* Veeder-Root Ltd. (New address on request)

# DESIGN ADVANTAGES

## in overall size and capacity...

...BEARINGS: **HYATT**




The design engineer who has a large selection of bearings to choose from, each differing in overall size and load-carrying capacity though fitting the same shaft, will find the task of designing greatly simplified.

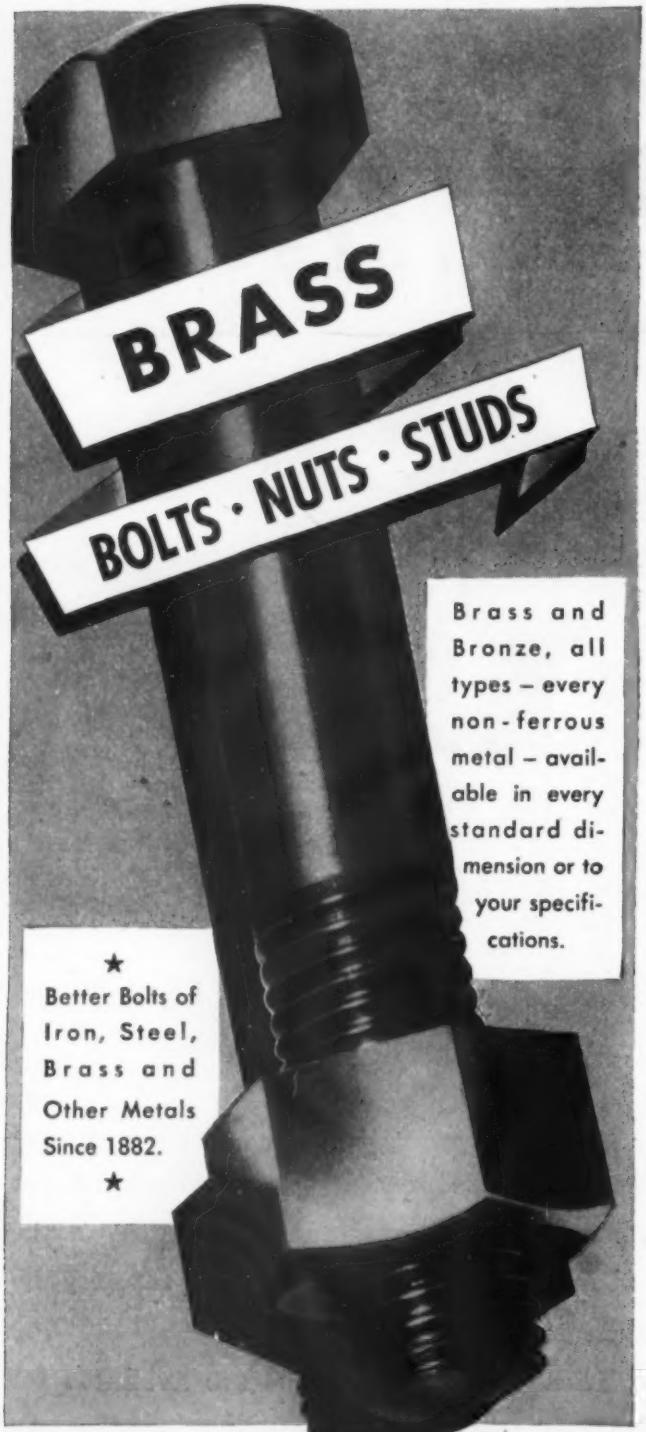
If the load is light he may select the narrow width of the medium series—gaining in economy of cost, weight and space. If loads are heavy and the permissible outside diameter is limited, there are the wide and duplex widths of this same series. If loads are heavy and axial space is not available, the narrow and wide widths of the medium series provide increased capacity by increasing the annulus size.

These five combinations are available for most of the standard bearing bore sizes. All are manufactured from the same select materials and with the same precision to provide quiet, care-free operation. Ask for our Hy-Load Bearing Bulletin.

**HYATT BEARINGS DIVISION · GENERAL MOTORS CORPORATION**

Harrison, New Jersey • Chicago • Detroit • Pittsburgh • Oakland, California

USE HEADED AND THREADED FASTENERS FOR ECONOMY AND RELIABILITY




Brass and Bronze, all types – every non-ferrous metal – available in every standard dimension or to your specifications.

★ Better Bolts of Iron, Steel, Brass and Other Metals Since 1882. ★

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"THE BOLT MAN"

THE PLACE TO SOLVE YOUR BOLT-PROBLEMS

# We Shall Not Fail Them

THERE will be jobs a-plenty *with alert manufacturers* who are alive to the almost universal range of advantages provided by OH-38 for new products—for the betterment of present products at lower cost.

Whether your plans are for heavy capital goods, or simplest household utilities, OH-38 can be most profitably figured in.

OH-38 is easily machinable—easy on tools—holds threads without stripping — non-corrosive — non-oxidizing—non-magnetic—tensile strength 35,000 to 40,000 lbs. per sq. in.—polishes to mirror brilliancy—takes chrome, nickel, or tin plating—may be anodized. It has been a basic factor of production in hundreds of plants for five years. Exclusively used in castings by Hedstrom. *Send for literature.*

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Many component parts of post-war products can be made better, faster, cheaper—with

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Aluminum Alloy, Non-Heat-Treated—a perfected metal with proven superiority in a wide range of machining operations—an exclusive product of

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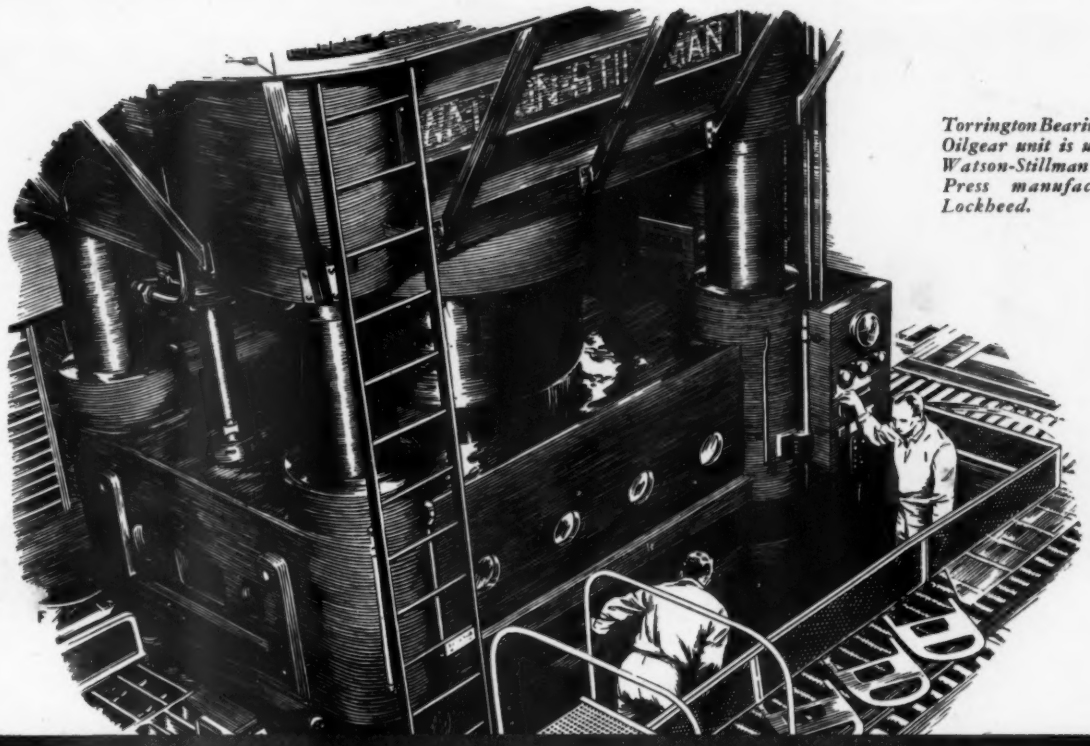
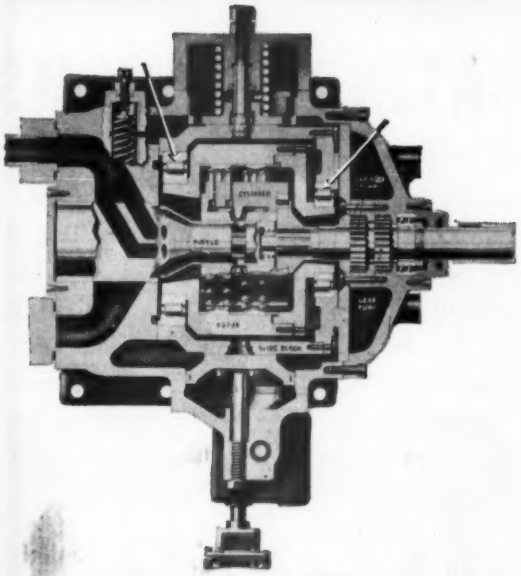
*Manufacturers of Aluminum, Brass, Bronze, and High Conductivity Copper Castings. Pattern Makers. Complete Mechanical Assemblies and Models to Specifications.*



*Torrington Bearing equipped Oilgear unit is used on this Watson-Stillman Hydraulic Press manufactured for Lockheed.*

# ROTOR OF OILGEAR POWER PUMPS TURNS ON TORRINGTON BEARINGS



*Arrows indicate Torrington Radial Roller Bearings on rotor assembly of Oilgear Two-way Variable Displacement Pump. Oilgear pumps are widely used for transmission of fluid power to hydraulically-operated broaching machines, presses, diecasting and plastic molding machines, and other equipment. Torrington also supplies pistons and rollers for these units.*

Oilgear fluid power pumps are known throughout industry for two outstanding qualities: long service life and precision of operation. Thus it is no surprise that the very "heart" of the unit—the rotor assembly—turns on Torrington Radial Roller Bearings.

Engineered for long, trouble-free service and accuracy of performance, Torrington Bearings facilitate the operation of units ranging from power pumps and other relatively light machinery to the heavy-duty equipment of steel mills, oil fields, and movable bridges.

Designing and building bearings to specific antifriction requirements has long been the year-around function of Torrington's Bantam Bearings Division. Our engineers will gladly cooperate with yours on any bearing problem, routine or unusual.

**THE TORRINGTON COMPANY · BANTAM BEARINGS DIVISION**
**SOUTH BEND 21, INDIANA**

# TORRINGTON BEARINGS

**STRAIGHT ROLLER • TAPERED ROLLER • NEEDLE • BALL**

**Get Improved Operation**

**FROM CRANES, CRUSHERS, PRESSES, DREDGES, MACHINE TOOLS, SHEARS, AND OTHER MACHINERY OF ALL KINDS**

# WITH *Trabon* LUBRICATING SYSTEMS

**Service-proved for years on all kinds of machinery, under all kinds of conditions, Trabon Lubricating Systems make certain that every bearing receives just the desired amount of lubricant, at just the desired frequency,—while the machine is in operation. Trabon Lubricating Systems prolong bearing life. They reduce accidents and compensation costs, and assure users a maximum of long, efficient, and trouble-free operation.**

**Let Trabon engineers with their long and successful experience in this work show you how a Trabon Lubricating System, individually engineered to the requirements of your own particular and individual job will increase your production, and cut your costs. Fully descriptive engineering bulletin sent on request. Simply tell us the kind of machine you wish to lubricate. Trabon Engineering Corporation, 1819 East 40th Street, Cleveland 3, Ohio.**

# *Trabon* LUBRICATING SYSTEMS

**. . . for Machines and Machinery of all kinds**

**INDUSTRIAL LUBRICATING EQUIPMENT EXCLUSIVELY SINCE 1922**

# A fast way to get motors...

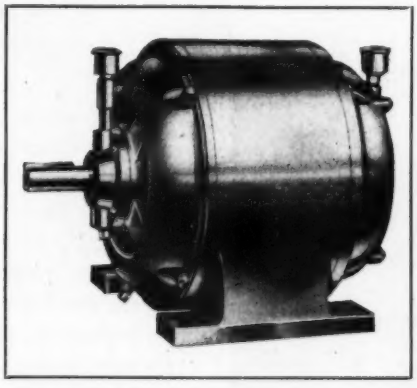
This suggestion is not addressed to buyers who use standard motors, although for them Star also has good news: Star began production of a large range of standard motors for stock weeks ago, and early delivery of some of these can be made.

To makers of products which require a motor that is somewhat "special" in frame design or mounting arrangement, Star's Welded Steel Construction may be a time-saver of great importance *right now.*

Star pioneered this method of construction, and developed unique production welding facilities to save the time and money that went into patterns and castings once required for "special motor" customers.

Exceptional strength and shock resistance is also gained through Star's Welded Steel Construction. This led to extensive use of Star Motors by the Navy long before the war.

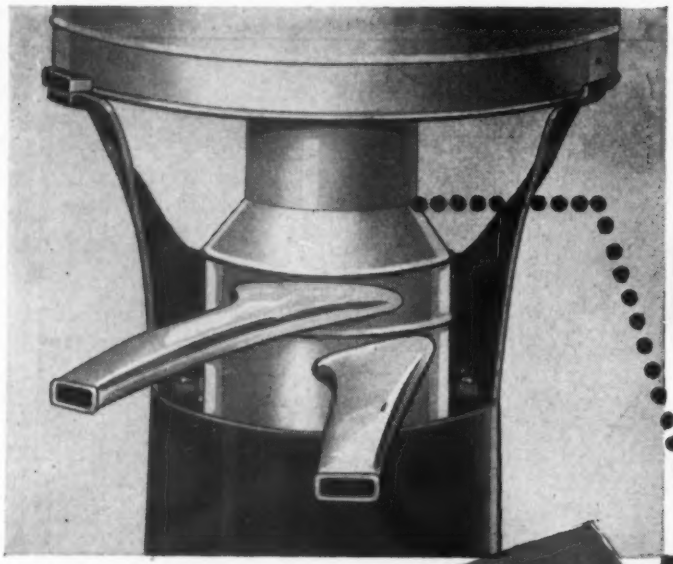
A number of prominent concerns, needing motors that vary from standard, have found that Star can help them to get motors faster than they thought possible. Star may be able to reduce *your* wait for motors. To find out, send a description of your requirements to Star Electric Motor Co., 216 Bloomfield Avenue, Bloomfield, New Jersey.



AC and DC Motors ⅛ to 200 HP;
AC and DC Generators to 150 KW

**STAR MOTORS**

**POWER PACKAGED AS YOU NEED IT**

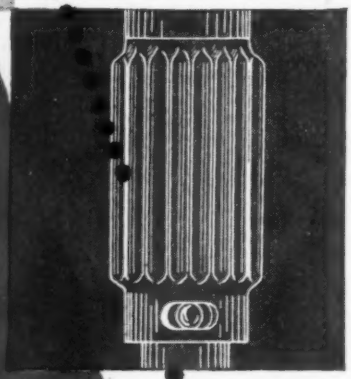


# another proof

## that Truarc Retaining Rings hold moving parts together better!

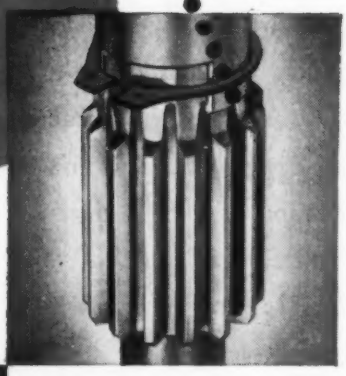
"The simplicity of the Waldes Retaining Ring assembly enabled us to conceive a design for our spindle that assured us of all the physical qualities required in a high-speed machine of this type."

(Signed)
AMERICAN SEPARATOR CO., Inc.



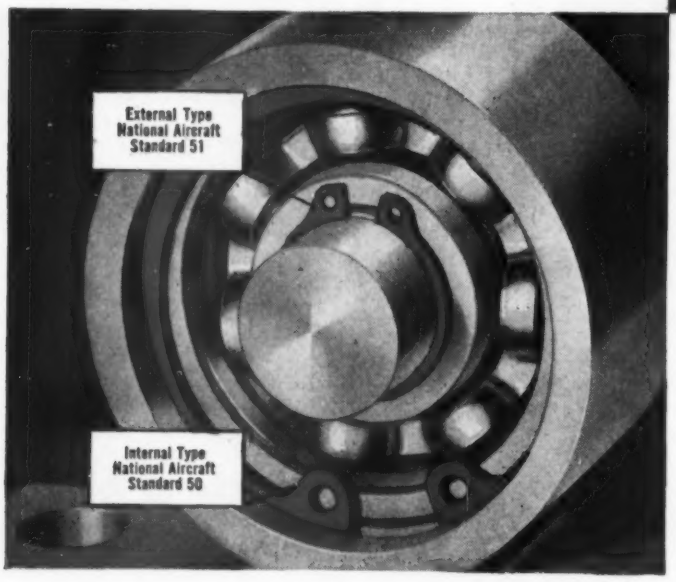
**BEFORE TRUARC**

The American Separator Company found no solution to the problem of excessive noise and vibration set up by the spur gear train action of this separator bowl revolving at 8500.



**AFTER TRUARC**

Truarc Retaining Rings eliminated vibration and noise while actually simplifying the assembly, achieving a rigid bearing of greater strength with no loss of speed!



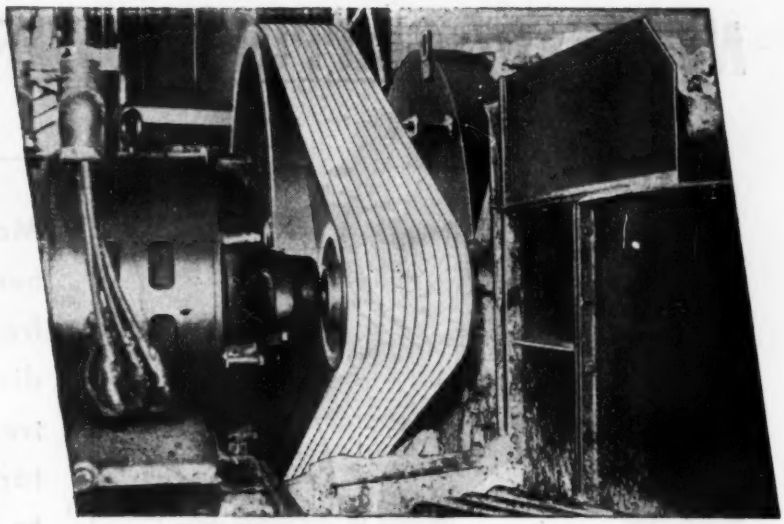

If your problem is holding together or positioning moving parts, you should know Truarc Retaining Rings. They offer important advantages over nuts, shoulders, collars and pins. They save space. They make assembly and disassembly easier, simpler, quicker. They keep their bulldog grip, hold their true circularity indefinitely under severe working conditions. Test Waldes Truarc in your products, in the machines that make them. Write for samples and complete data. Dept. 13-10.

**WALDES TRUARC RETAINING RING**

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, NEW YOR

CANADIAN REPRESENTATIVES: FRENCO PROGRESS CORP., LTD., 72-74 STAFFORD STREET, TORO

U. S. PAT. RE-18,144



# Today-

## Your *Standard* GATES VULCO ROPES

## are giving BETTER SERVICE than ANY V-Belts EVER Built Before the War!

To meet the unprecedented severity of combat service on U. S. Army tanks, tractors and self-propelled big guns, Gates developed and built V-Belts *far superior* to any that were ever built before--and here is why this fact is important to YOU:—

✔ **Every improvement developed by Gates for these Army V-BELTS has been added, day by day, to the quality of the standard Gates Vulco Ropes which have been delivered to you.**

You have not had to wait until after the war for these improvements for the simple reason that more efficient V-Belts have been an important factor in increasing essential war production. That is why your standard Gates Vulco Ropes are today the best V-Belts that have ever been delivered to you.

*In addition,* where V-Belts of special construction are required, your Gates Rubber Engineer is in position to supply a Gates Vulco Rope that is especially engineered to meet your special needs. You need only pick up your phone book and look under the heading "Gates Rubber." The Gates Rubber Engineer will bring to you, right in your own plant, the very latest advances in V-Belt construction and in drive operation as well.

*and NOTE THIS:—*

**Gates also makes these special belts to meet exceptional service needs.**

- Rayon Cord V-Belts
- Static-Safety V-Belts
- *Special* Synthetic V-Belts
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**All Gates V-Belts are Built With** *The Patented* **CONCAVE SIDE**

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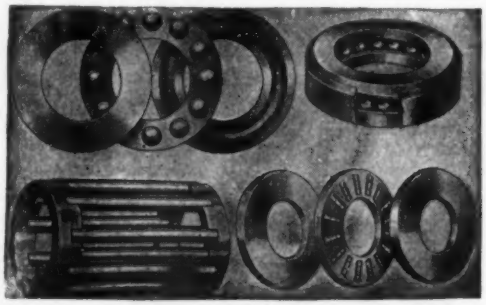
This large gear weighing approximately two tons meshes with a split pinion weighing 1050 pounds. Stahl produced both.

Why not have Stahl estimate on your gear requirements—regardless of size or quantity.

THE STAHL GEAR & MACHINE CO.
CLEVELAND OHIO



**B & R B**

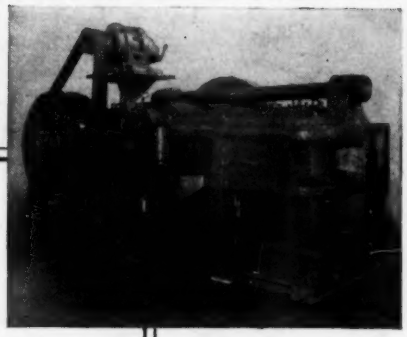
B & R B PRECISION BEARINGS in standard sizes, special sizes to your own specifications.

**THE BALL & ROLLER BEARING CO., Danbury, Conn.**

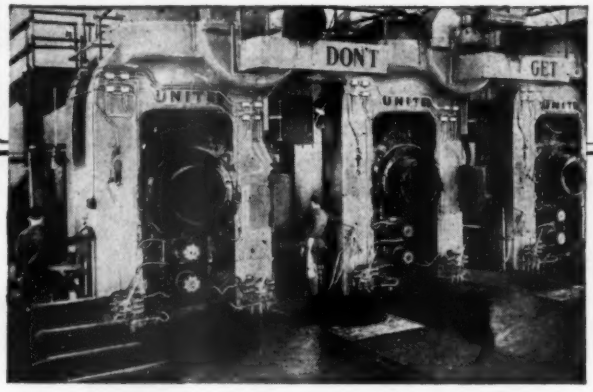
## GEAR CUTTING MACHINES

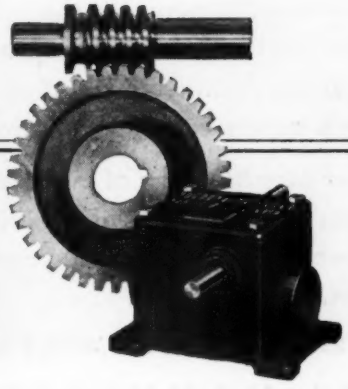
New Design
New Features
New Advantages

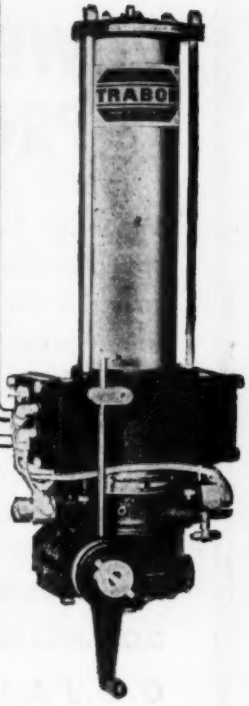
**NEWARK GEAR CUTTING MACHINE CO.**
**69 Prospect Street, NEWARK 5, NEW JERSEY**
FRANK E. EBERHARDT, *President*



# OHIO GEARS
## Help *Trabon*
## Insure Automatic Centralized Lubrication






The sole value in an automatic, centralized lubricating system is to be *automatic* . . . to assure complete, positive lubrication of every bearing at regular, carefully timed intervals without constant attention. Trabon Engineering Corporation spares no detail to insure such dependability in Trabon systems.

Of prime importance is the drive mechanism. Failure here could lead to disastrous results. So special attention is given to the selection of gears, worms and speed reducers as required on the various Trabon Models. They must be tough, long lived, precision made to rigid specifications. Because they are familiar with Ohio Gear dependability, Trabon engineers specify Ohio gears and reducers. Through long years, on some of Trabon's toughest installations these nationally known drives have faithfully kept their reputation for dependable, trouble-free service.

Helping Trabon to keep bearings "well greased" is another Ohio Gear contribution to America Inndustry.

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**1326 EAST 179th STREET • CLEVELAND 10, OHIO**

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MAKERS OF EVERY TYPE OF GEAR AND GEAR SPEED REDUCER

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## POWER SAVING PRODUCTS

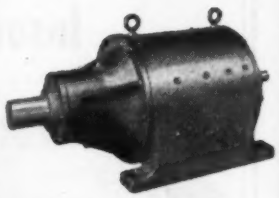
We have been making various types of cut gears and gear speed reducers for many years . . . Our extensive present day facilities for their manufacture are the outcome of developing an organization that would capably handle our resultant expansion . . . These facilities give us a capacity that readily handles industry's power-saving requirements.

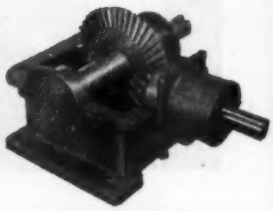
Our experience of over 58 years of manufacturing various types of gears and gear reducers is invaluable in the selection of the proper type of gear speed reducer for your power-saving transmission problems.

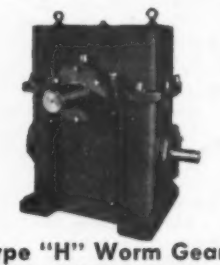
*D.O. James Gear Sales-Engineers are located in key industrial centers.*

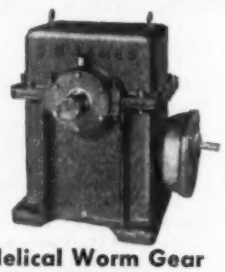
D.O.JAMES MANUFACTURING CO.
1140 West Monroe Street Chicago, Ill.

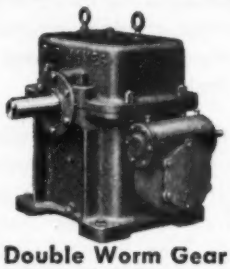
Continuous-Tooth Herringbone Speed Reducers

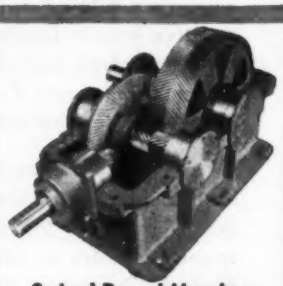

Planetary Gear Speed Reducers


Spiral Bevel Gear Speed Reducers

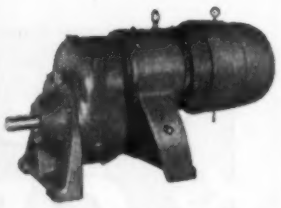

Type "H" Worm Gear Speed Reducers

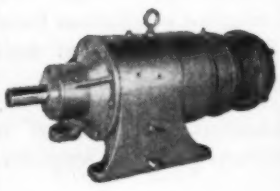

Helical Worm Gear Speed Reducers

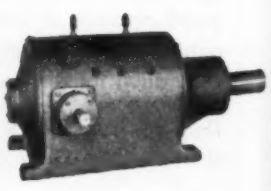

Double Worm Gear Speed Reducers


Spiral Bevel Herringbone Speed Reducers

Motorized Worm Gear Speed Reducers


Motorized Helical Gear Speed Reducers


Motorized Planetary Gear Speed Reducers


Spiral Bevel Planetary Gear Speed Reducers

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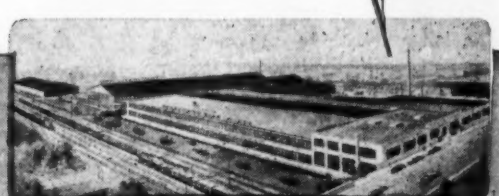

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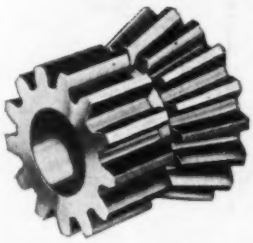

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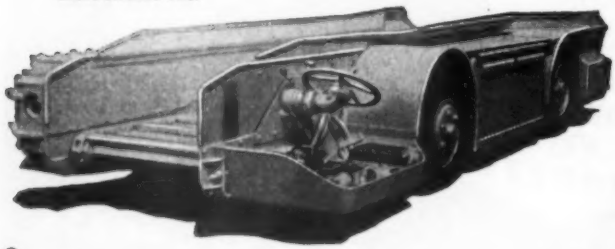

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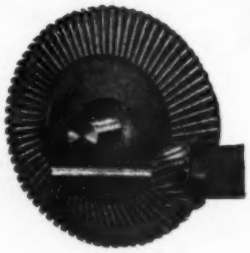

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Two technical bulletins—one on Aircraft Quality Gears, and one on Power Units—have recently been issued by Foote Bros. Copies will be sent to you upon request.

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Compact power units, self-contained with electric motors, driven by flexible shafts or directly coupled to the power source, are now being developed to meet a wide variety of industrial requirements. Write for Bulletin.

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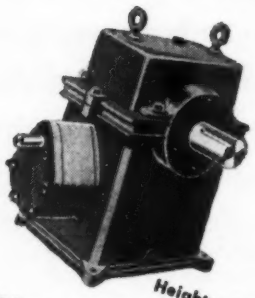

Heights: 10¾ to 58¼ inches

Foote Bros. speed reducers are made in a wide range of sizes and gear ratios to meet practically every industrial need. See your Foote Bros. representative or write for information concerning your needs.

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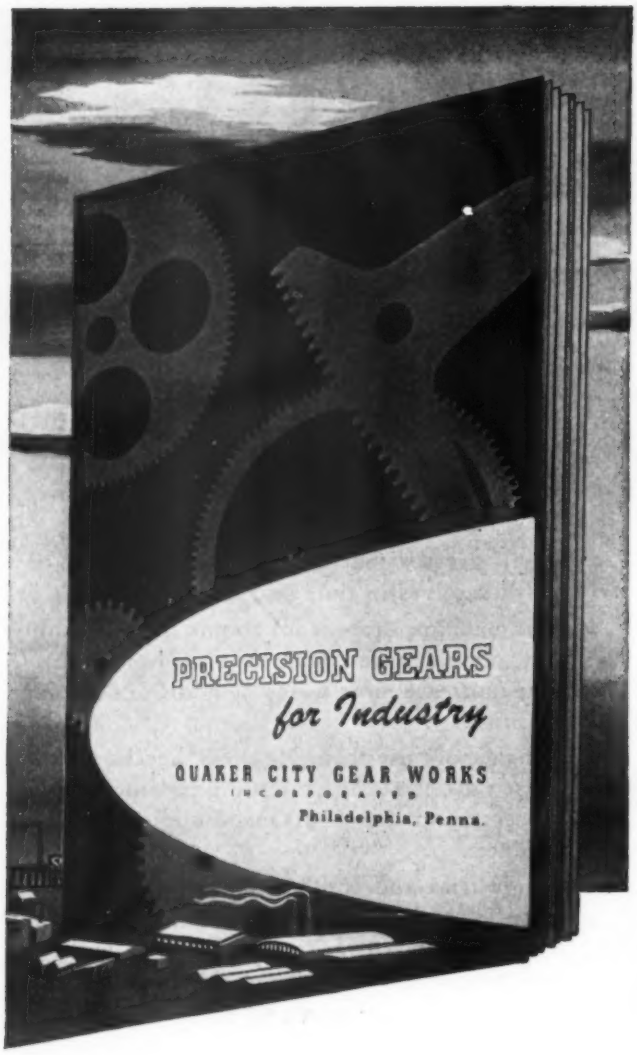
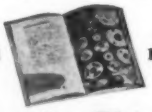



# Yours for the asking

**A new informative booklet on gears. It has illustrated sections** **on practically every known form of gearing, together with**  **many reference tables and formulas. Write for your copy today on your company stationery.**

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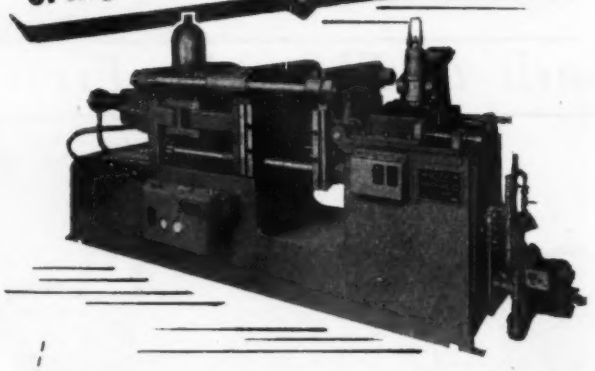

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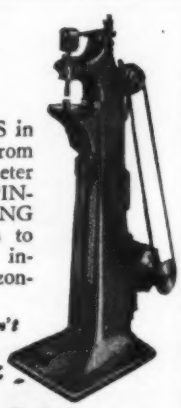

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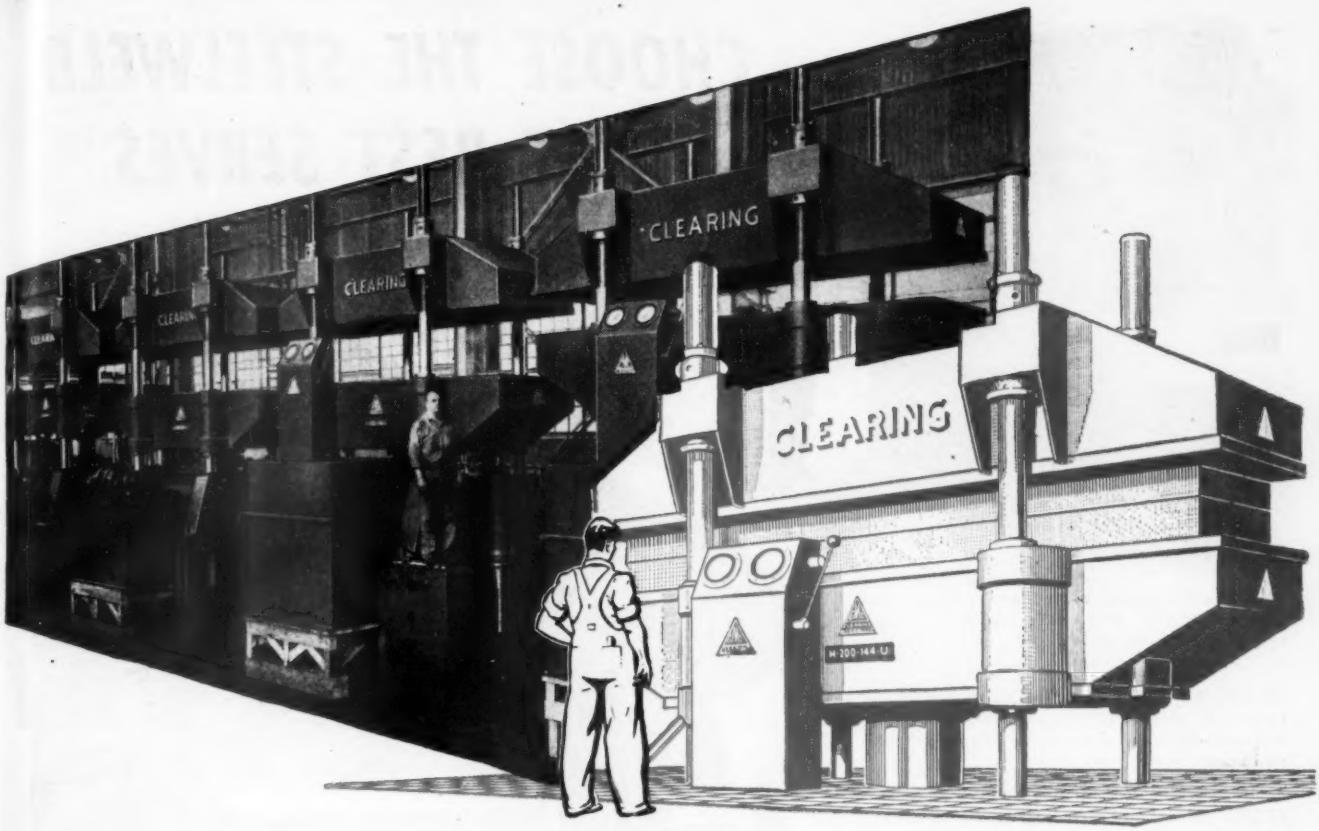


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The operating specifications that Clearing met in designing the presses shown above were most unusual. A single work cycle covers a period of approximately three hours and twenty minutes per press. The work handled is a tubular steel product that comes to the press in two separate parts, already formed and hot. During the work cycle, the press not only performs finish forming operations, but acts as well as a unique holding fixture while the parts are precision brazed and cooled.

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MECHANICAL AND HYDRAULIC PRESSES
FOR SUCH OPERATIONS AS DRAWING + BLANKING + FORMING + FORGING

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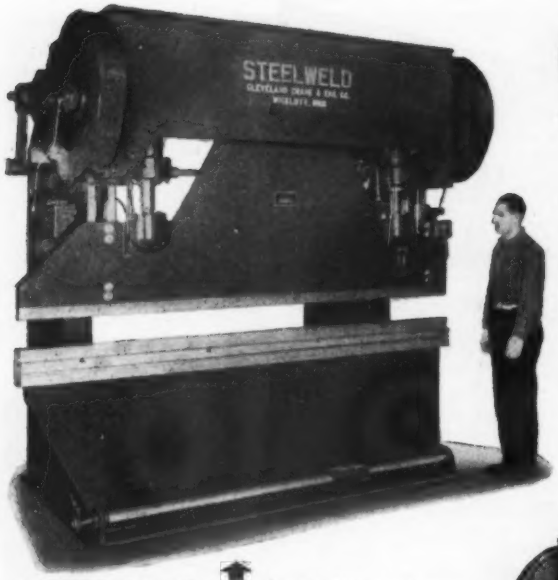
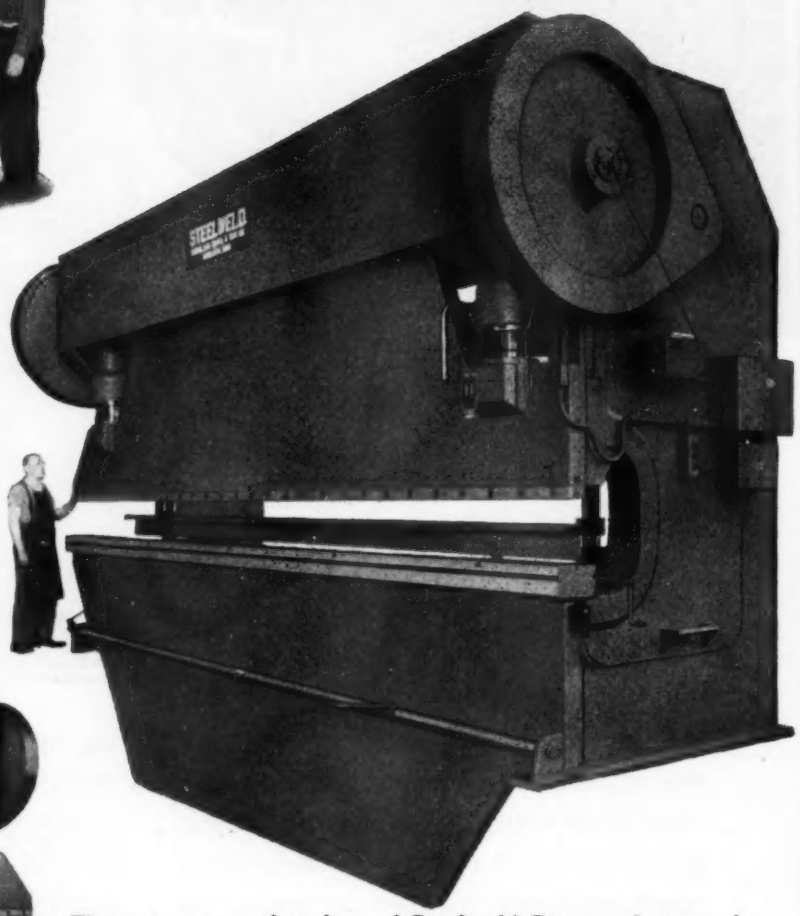



*MODEL F3-6 handles plate 6' x ¼" between housings and 9' x ⅜" over entire length of bed and ram. Has 1'-0" extension on left end*

*MODEL J4½-16 bends cold steel plate up to 19 x ⅜" or 8' x ⅛". Because of distance between housings, bed extends below floor to assure straight, accurate bends.*

*MODEL H3½-8 for braking, forming and punching plate 8' x ⅜" between housings and 14' x ⅛" over entire length of bed and ram. Provided with 2'-0' extension on each end.*

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*Many other Steelwelds are available for plate of thickness to one inch.*

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# STEELWELD

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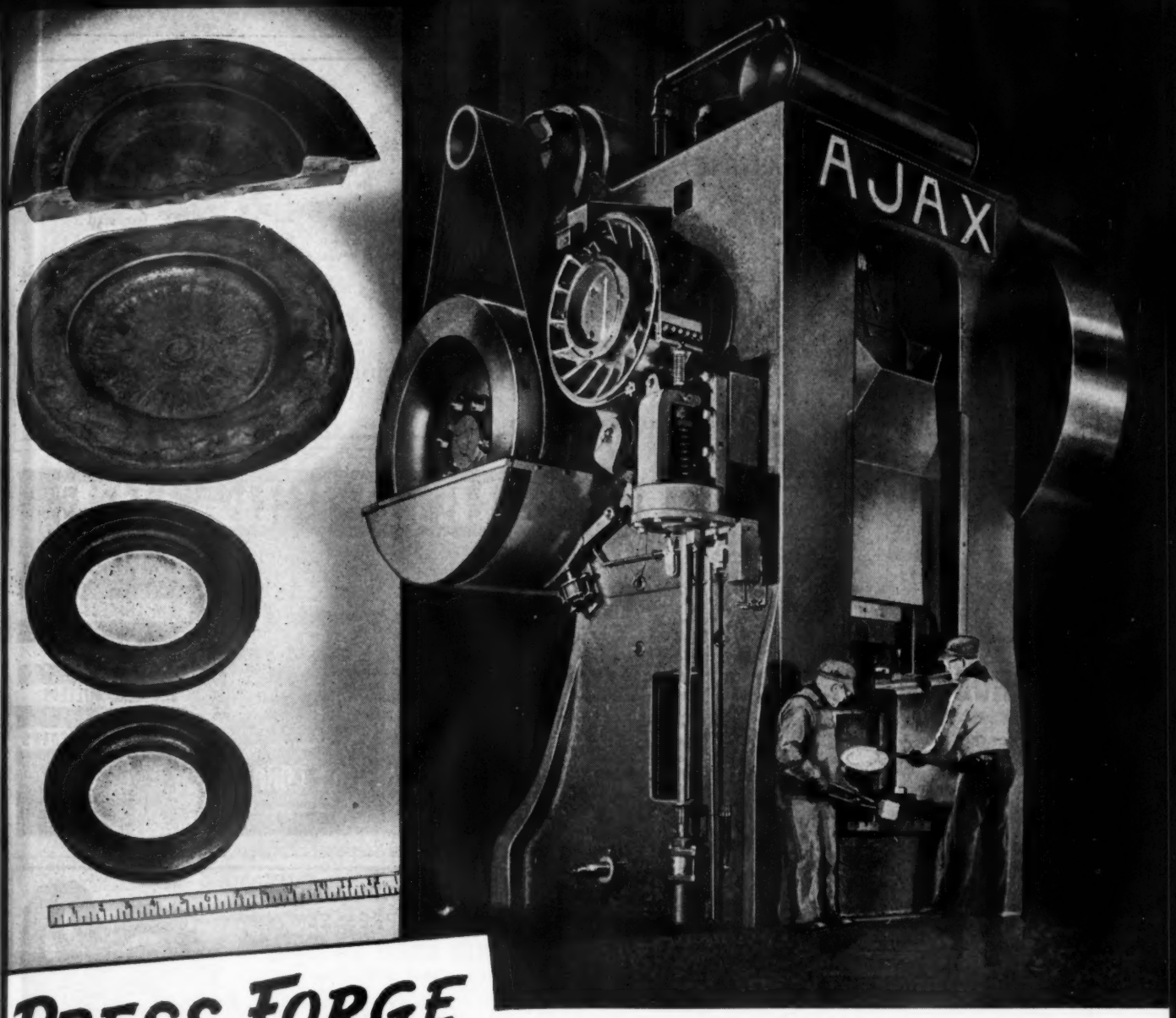
**BRAKING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING**

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Automotive differential ring gear blanks as well as many other types of multi-stage forgings can be forged profitably in a single heat and at a high rate of production on Ajax Air Clutch controlled Forging Presses. The soundness of mechanical construction of Ajax Presses, embracing many exclusive, patented, mechanical features, effects a high degree of accuracy of the finished forgings. The massive solid steel frame provides a maximum of rigidity. The air clutch contributes to the greater speed and ease of operation. The exclusive rear extension guided ram with its great over-all guided length, maintains accurate alignment of dies in spite of off-center pressures of multi-stage forging. The illustration at left shows a cross section and three sizes of press forged ring gear blanks.

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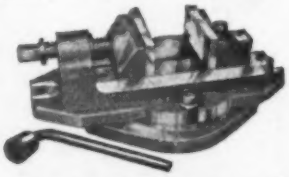

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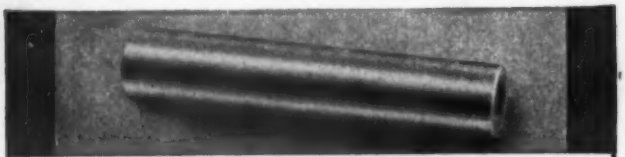

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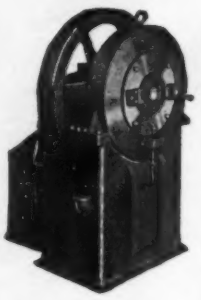

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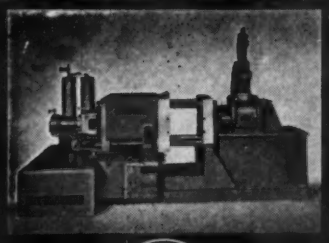

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← Pronounced "DIE-ACK-RO"

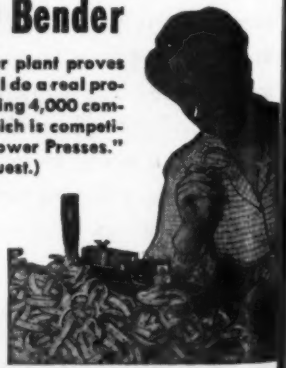
## 4,000 Parts Per Day With DI-ACRO Bender

Here is an example of "DIE-LESS DUPLICATING" typical of a great variety of formed parts readily made with DI-ACRO Precision Machines — Benders, Brakes, Shears. Picture shows the finished part formed to die precision, including acute right angle bend. Women operating DI-ACRO units maintain a high out-put on production work.

**"Enclosed picture in our plant proves the DI-ACRO Bender will do a real production job. We are making 4,000 completed parts per day which is competitive to most Power Presses." (Name on request.)**

DI-ACRO BENDER No. 1

★



DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING

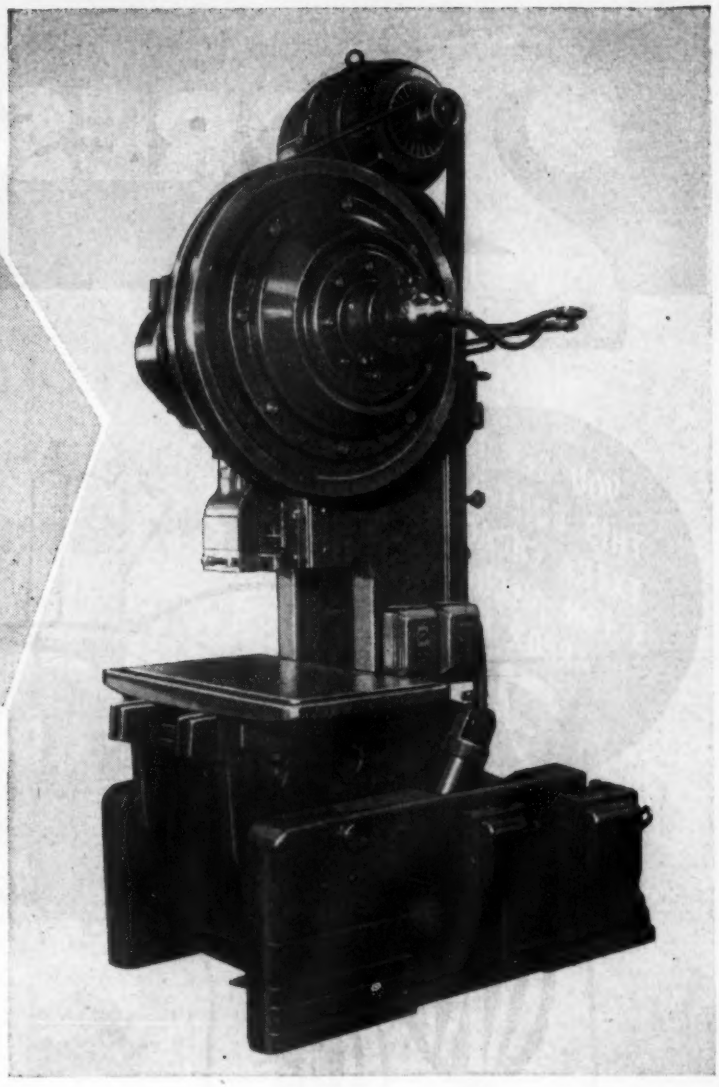
**O'NEIL-IRWIN MFG. CO.** 311 EIGHTH AVE. SOUTH • MINNEAPOLIS 15, MINN.

# *New in DESIGN- Hydraulic Control*

## High RELIANCE Speed

## INCLINABLE PUNCH PRESS

*featuring*



1—Hydraulic Clutching and De-Clutching

2—Hydraulic Control for Brake Action

3—Hydraulic Controls for Inclining Press

4—Hydraulic Control Positive Stop

5—160 Strokes per Minute

6—Faster Intermittent Operation

7—Timken Bearings in the Flywheel

8—Extremely Quiet Operation

9—Single-Stroke, Safety Non-Repeating or Continuous Operation

10—More Pieces per Hour, Less Operator Fatigue

11—Simple in Operation and High in Production

*. . . faster—more easily operated and*

## AVAILABLE FOR PROMPT DELIVERY

This new machine — in 40-50 ton capacity — provides the answer to the problem of greater production of better work at lower cost.

Full hydraulic control (employing equipment of standard manufacture), coupled with greater speed (160 strokes per minute), assure an entirely new conception of punch press performance.

All of the features contributing to the demonstrated outstanding performance of this modern press have been realized in a simplified design which provides for easy and accessible adjustments. Sturdy construction and generously proportioned bearings assure long, accurate service. Utmost safety is achieved by automatic control between clutch and brake.

Now is the time to explore the possibilities of this NEW machine as a means of cutting your costs—*NOW* when we are in position to make PROMPT DELIVERIES.

*Send TODAY for detailed specifications.*

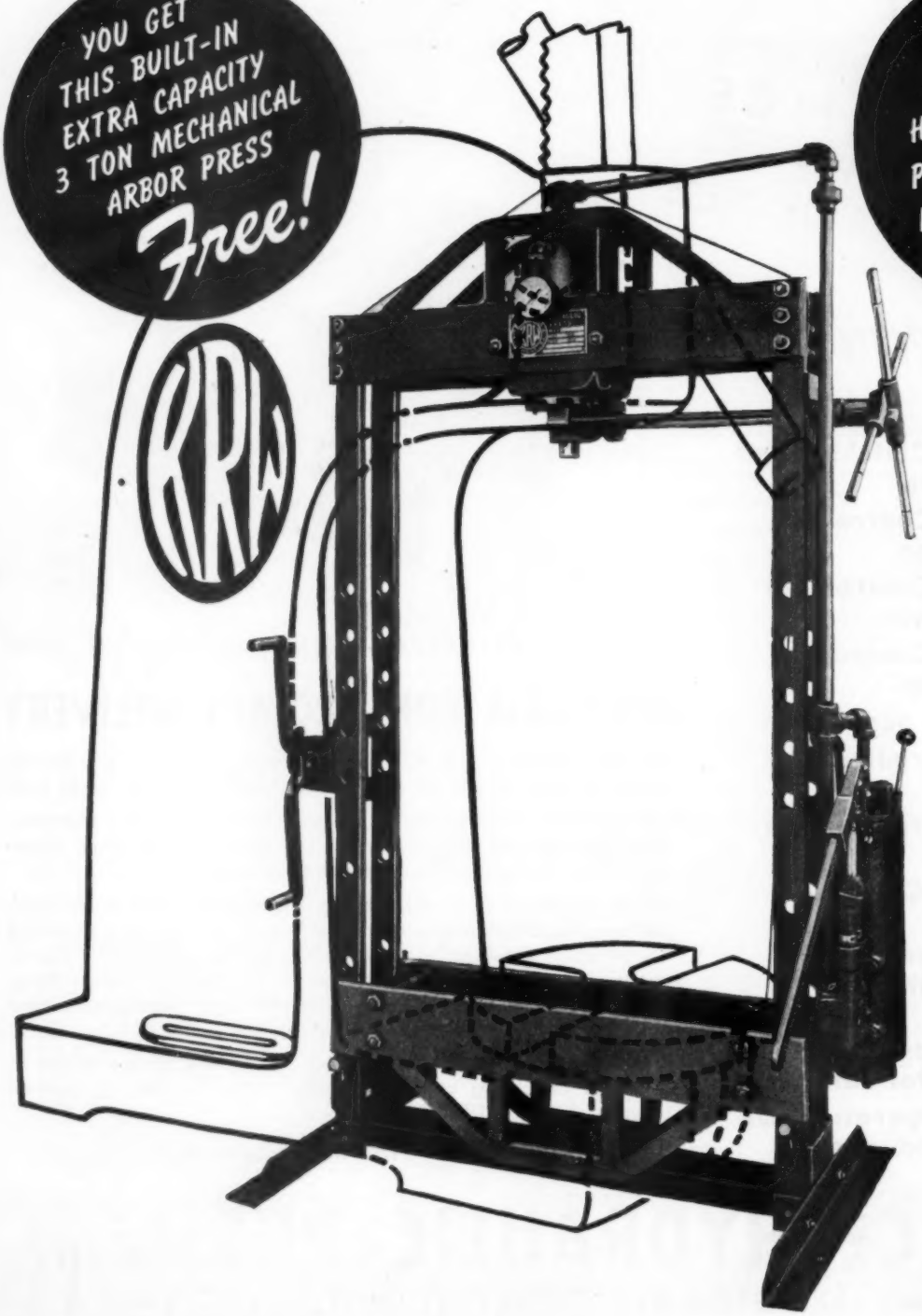
## RELIANCE HYDRAULIC PRESS INC.

405 LEXINGTON AVE. NEW YORK 17, N. Y.

# 2 PRESSES FOR

YOU GET THIS BUILT-IN EXTRA CAPACITY 3 TON MECHANICAL ARBOR PRESS *Free!*

THIS KRW HYDRAULIC ARBOR PRESS IS AVAILABLE IN 25, 50, 60, OR 75 TON CAPACITY

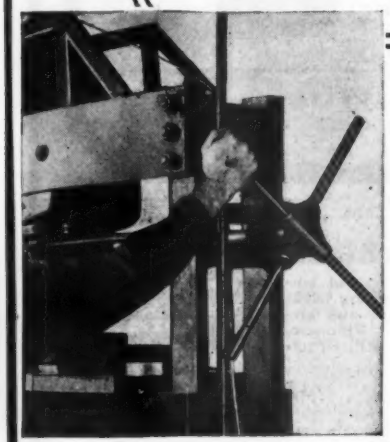



OPEN ENDS TO HANDLE *Extra long* WORK

● KRW Hydraulics require no unnecessary pumping. Just raise the Table to required height and put the Table Pins in place. Then bring the Ram down against the work with the "Capstan" type Hand Wheel, if the job requires less than 3 to 4 Tons. The operation is completed quickly and easily. If it needs more power, just push the hand control lever (located on the side of the Oil Tank) forward, and with the very first stroke of the Hydraulic Pump handle you will get at least 7 Tons, the second stroke 10 Tons, and so on. The PRESSURE GAUGE, within easy range of the eye, shows the exact tonnage required to do the job. The TWO-SPEED PUMP reduces the effort.

# THE PRICE OF 1

## YOU GET A "BUILT-IN" EXTRA CAPACITY MECHANICAL ARBOR PRESS FREE WHEN YOU BUY A *KRW HYDRAULIC ARBOR PRESS*



● No hydraulic Arbor Press is up-to-date unless it incorporates a 3-ton mechanical arbor press. To be thoroughly practical, it must be "built-in"—NOT built-on. KRW Provides this extra feature at no extra cost—as an integral part of every KRW Hydraulic Arbor Press. With a KRW Press, mechanical pressing or straightening operations are limited only by the adjustable capacity of the hydraulic press bed, not by the capacity of a small "built-on" mechanical press (i. e., 31″ between uprights, 44″ from ram to top of table in lowest position). No other make of press can boast of this design. Long or short bars, propeller shafts, axles, etc., can be placed in the "V" Blocks, tested for alignment and straightened without removal for any part of the operation —insuring speed and accuracy.

On KRW Hydraulic Presses, the "capstan" type hand-wheel (shown at left) rotates a pinion which meshes with a rack cut into the ram. The sliding handles can be extended to increase leverage and pressure. Grooves in the handles engage a spring backed ball to lock the handle in two positions. KRW Presses have other features which contribute to low first cost as well as low operating cost. Investigate—write for our fully illustrated Hydraulic Arbor Press catalog. K. R. Wilson, Dept. 11 215 Main St., Buffalo 3, N. Y.

SEND FOR THIS 24-PAGE ILLUSTRATED HYDRAULIC PRESS CATALOG ...full of valuable data!

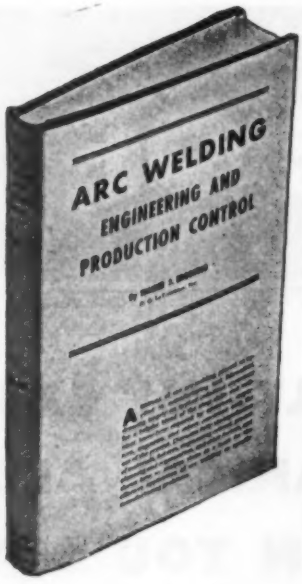
SINCE 1918 A WEEK OF DEPENDABILITY KRW

**K. R. WILSON**

**BUFFALO 3, NEW YORK**

**For more efficient, economical, profitable**

**arc-welded production**




You can get the background, the technical know-how you need to analyze any arc-welding problem on the basis of its means of control—all readily available in this new book!

# ARC WELDING ENGINEERING and PRODUCTION CONTROL

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*Director of Testing and Research, P. G. LeTourneau, Inc.*

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—Mass Production with Alternating Current Welding

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Make this technical know-how yours. Get the facts on arc welding as a major production method. Know the problems to expect, and the solutions to meet them, in arc-welding production and control. Here at your call is a wealth of information on arc-welding specifications, material control and arc-welding costs, jigs and fixtures for arc-welded mass production, the inspection, machining of arc-welded products, the training of arc-welding operators, and a great deal of other valuable data so often learned expensively by experience alone.

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What is the cost of poor fit-up and overwelding, and how can it be avoided?

When is it best to use direct current welding and when alternating current?

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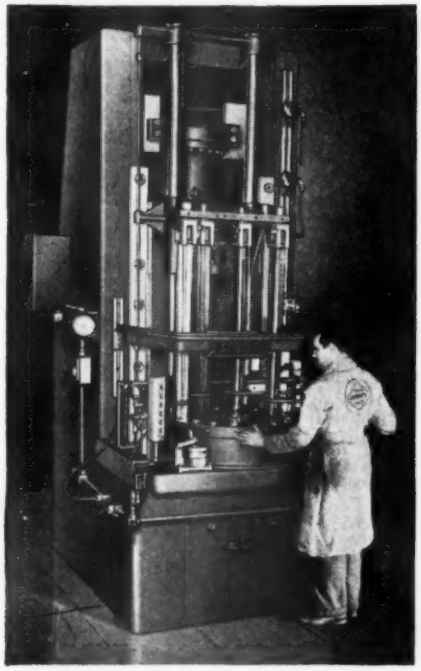
McCormick-Deering cotton picker in operation

# LAND O' COTTON

Picking cotton by machinery may take away the glamour . . . but it sure adds to the profits — especially when the cotton picker is a precision machine. New post-war cotton pickers are depending upon broaching for close tolerance in their mass production parts.

Huge improvements expected in the farm implement field will come about through economical and efficient mass production of precision parts by broaching. With machinery costs at a minimum, manufacturers of agricultural products are turning to the Lapointe engineering staff for help in the saving of time, money and space.



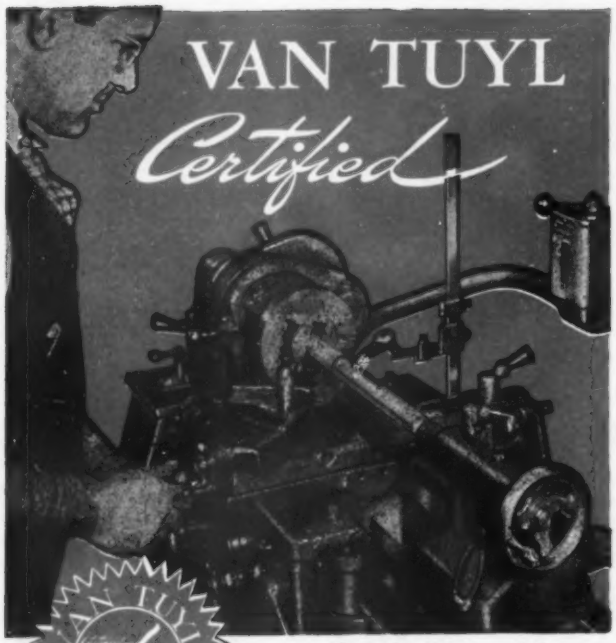
Lapointe special double ram vertical machine for broaching top, bottom and both ends of motor blocks. This is a 30-ton, 66-inch stroke machine.

THE Lapointe

MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U.S.A.

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES




*Above: Alignment test, one of thirty detailed machine condition checks.*

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*And . . .*

*—if equipment meets the rigid Van Tuyl Engineering standards, it is so Certified.*

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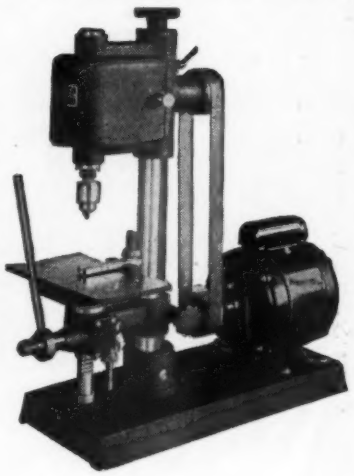
## *When Minimum Fractional Precision Is Imperative*

# HAMILTON MACHINES

***for better seeing • better feeling • better drilling***

### HAMILTON SENSITIVE TAPPER



More units per hour. For tapping operations on instrument, camera, watch, clock, business machines and all other precision work. Smooth, easy operation *without breakage of even the smallest taps.*

Fool-proof; noiseless, head mechanism is completely hooded so operator is protected from oil and dirt.

For any threadable material. From smallest and finest thread, up to and including 10-32.

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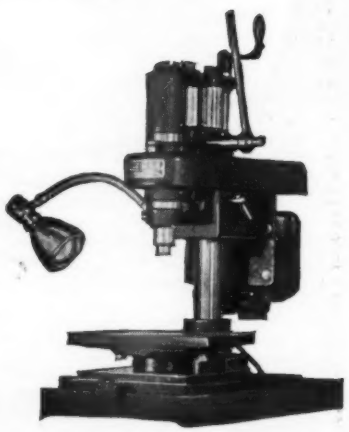
### HAMILTON "VARIMATIC"

***Super-Sensitive Drilling Machine***

***for small holes .004" to 5/16" diameter***



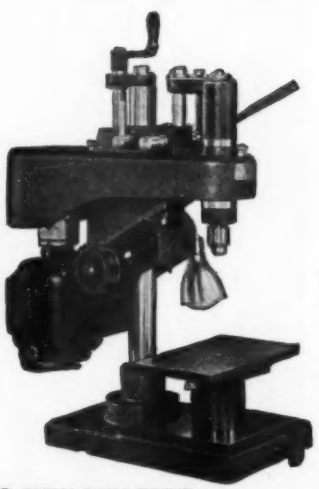
Two speed ranges, infinitely variable. Built with "instrument precision" for finest drilling in tool rooms, Diesel, instrument, electrical, aircraft and other uses. Bold in design, sturdy, convenient, perfectly constructed. Self-contained drilling unit swings radially on column and locks to any position. From 840 to 9300 r.p.m.

• • •

### HAMILTON "MAXI-JR-E"

***Super-Sensitive Drilling Machine***

***for small holes .004" to .250" diameter***



May be used singly or in gangs. Possible spindle speeds from 750 to 12,000 r.p.m. Full floating spindle designed to eliminate radial belt pull on the spindle. Within its capacity the extreme flexibility of MAXI-JR-E meets all requirements conveniently and economically.

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THE HAMILTON TOOL CO.
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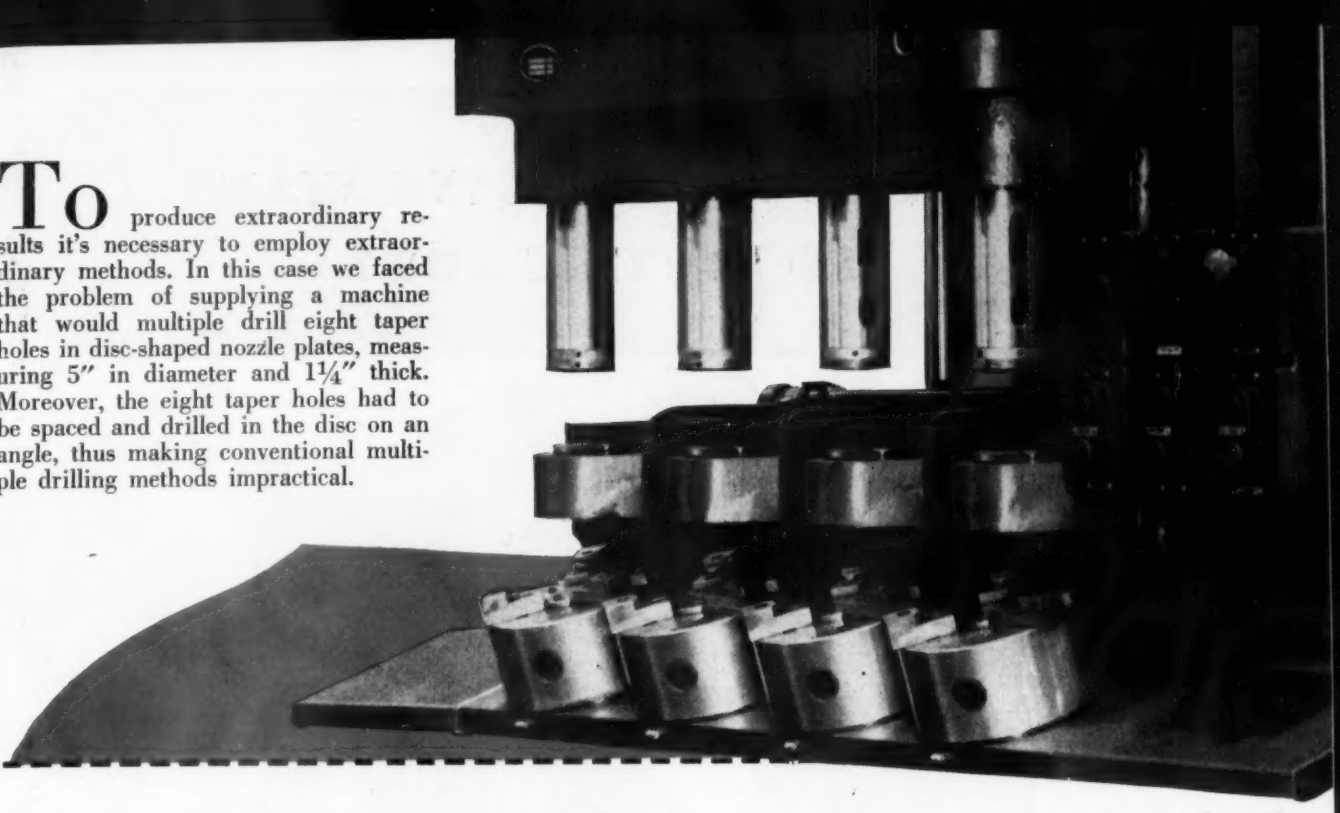


To produce extraordinary results it's necessary to employ extraordinary methods. In this case we faced the problem of supplying a machine that would multiple drill eight taper holes in disc-shaped nozzle plates, measuring 5" in diameter and 1¼" thick. Moreover, the eight taper holes had to be spaced and drilled in the disc on an angle, thus making conventional multiple drilling methods impractical.

# Here's an Unusual Job!

BAKER Engineers worked out a practical solution by equipping BAKER's standard Model 26-HO with

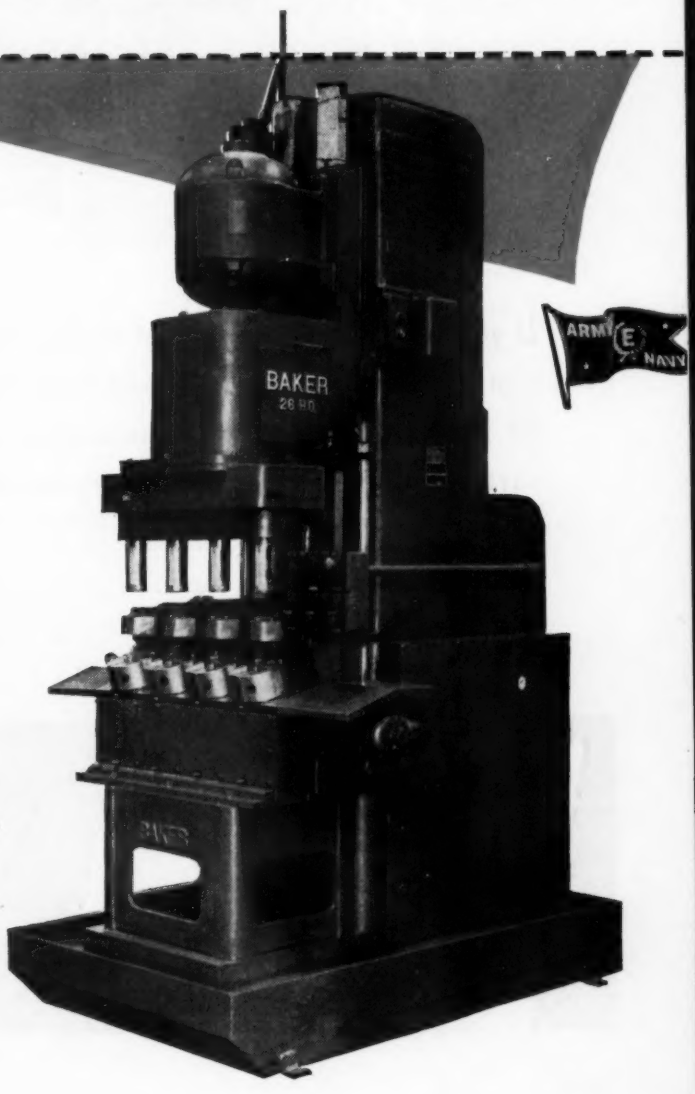
. . . **a simplified drive**

. . . **a fixed center multiple drilling head, featuring four 3-jaw chucks mounted on an angle**

. . . **four specially ground solid twist drills, taper ground.**

The spindles, spaced to drill one hole in each of the four parts at one time, are operated automatically. The operator loads four discs, one in each chuck, touches a push button and the machine starts an automatic cycle that drills the required eight holes in each of the four parts . . . all without further assistance from the operator.

*You want equally suitable, efficient solutions to your problems. Your letter to BAKER, describing the product and desired result will bring immediate cooperation —and the answer!*

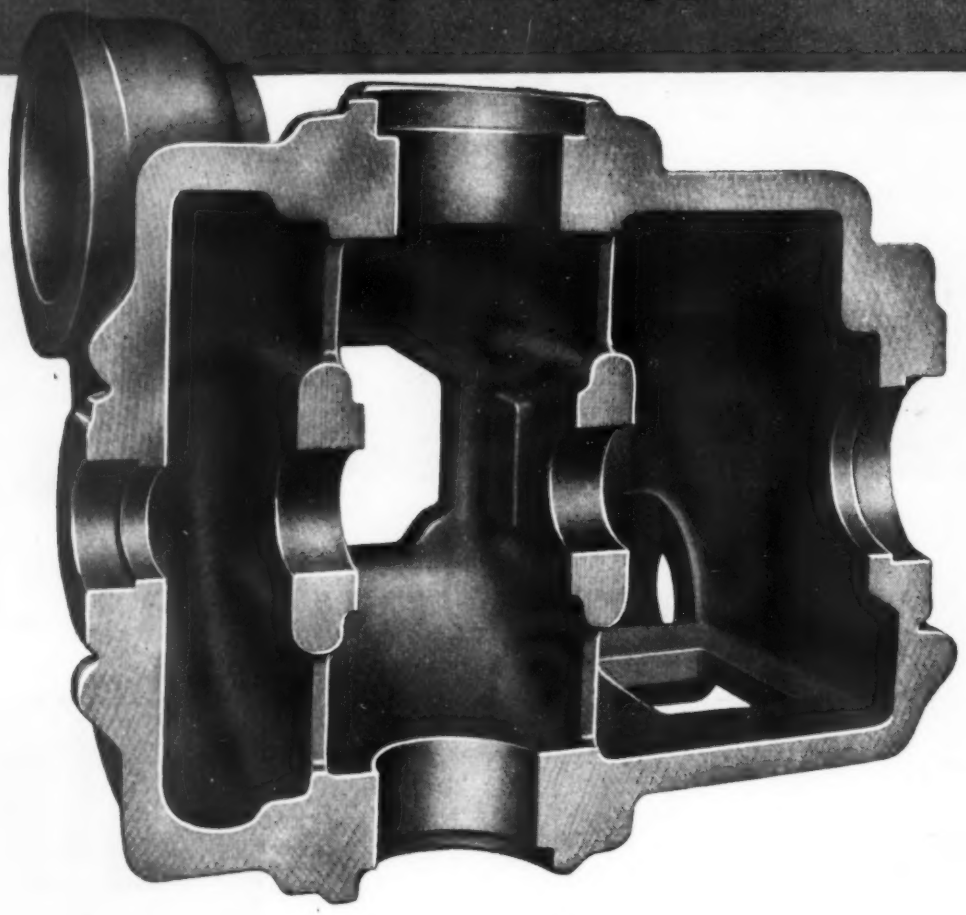



**BAKER Bros., Inc.**

**Single and Multiple Spindle Machines for Drilling, Boring and Tapping**

**TOLEDO 10, OHIO**

# KNOW ANY FASTER WAY TO DO THIS JOB?



If you were given the job of facing the joint in this housing, how would you do it? It's cast iron, overall dimensions of surface—16¾" x 21¾". Stock to be removed 3/16".

Unless you knew a faster way, you'd tag this job for a Diamond Face Grinder because face grinding takes only 15 minutes floor-to-floor!

If you know of no faster way, look into the Diamond Face Grinder today. Write at once for Bulletin 44-G.

"THE DIAMOND D THAT CUTS YOUR COSTS"

**MAIL TODAY FOR NEW FOLDER**

Diamond Machine Company of Philadelphia
2405-D Aramingo Avenue, Philadelphia 25, Pa.

Gentlemen: Please send me promptly your Bulletin 44-G which shows how to speed-up production with the Diamond Face Grinder.

Name _____ Title _____

Company _____

Address _____ State _____

City _____

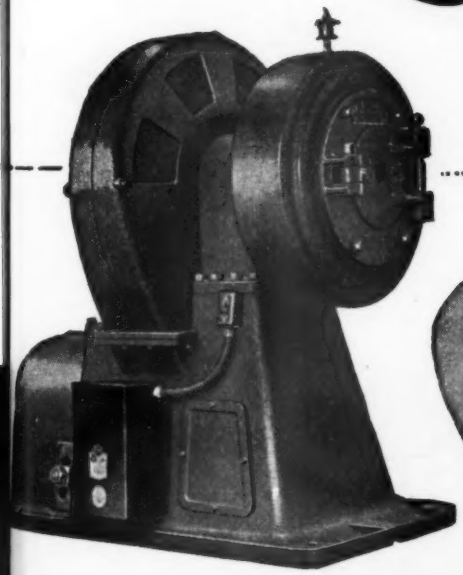
# *Can you produce this part... without machining?*

## ETNA SWAGING UNITS
## Can... and do!

Another in a series illustrating the countless tapering, sizing and reducing jobs that are being handled faster and more efficiently because of Swaging!

Normally, the part shown would require involved and expensive machining . . . but not when it is produced on an ETNA Swaging Unit! An ETNA Unit can turn out this same part, to the same specifications in a fraction of the time at greatly reduced cost. This saving comes in this way; no metal is cut off or wasted, machining is eliminated and the job can be handled by one man on one machine. Because the finished part, when handled on an ETNA Swaging Unit, has a burnished surface, finish-machining is often eliminated.

Drop a note to ETNA today—describe your tapering or reducing requirements. We'll send the facts on Swaging and its advantages as applied to your operations.



NA Swaging Machines are built in standard sizes th maximum capacities from ⅜" to 6"—die gths up to 18" for tapering, sizing and reducing hollow, solid, round or angular parts. Larger sizes e furnished on order.

IF IT'S A QUESTION OF TAPERING, SIZING OR REDUCING OF ROUND SOLIDS OR TUBING

"Ask ETNA about Swaging"

*The* **ETNA** *Machine Co.*

3400 MAPLEWOOD AVENUE

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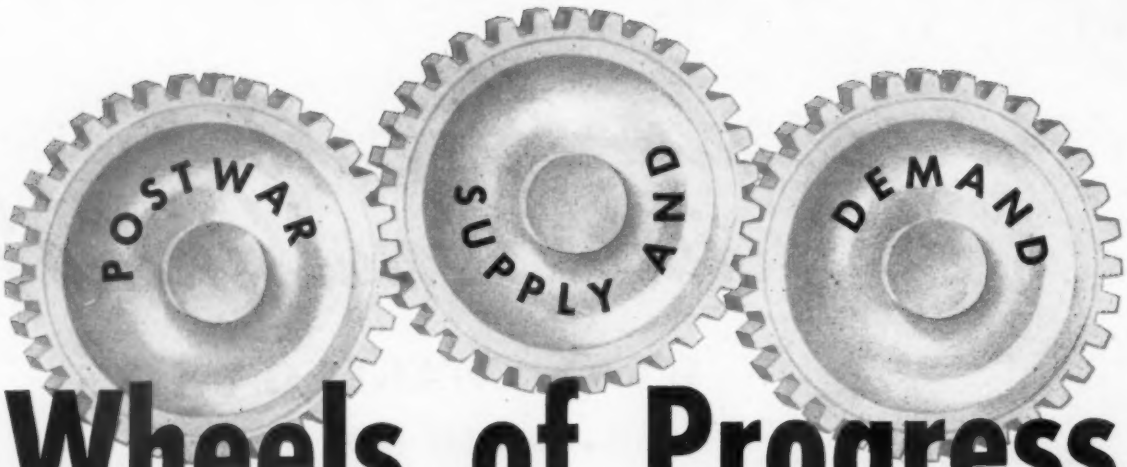
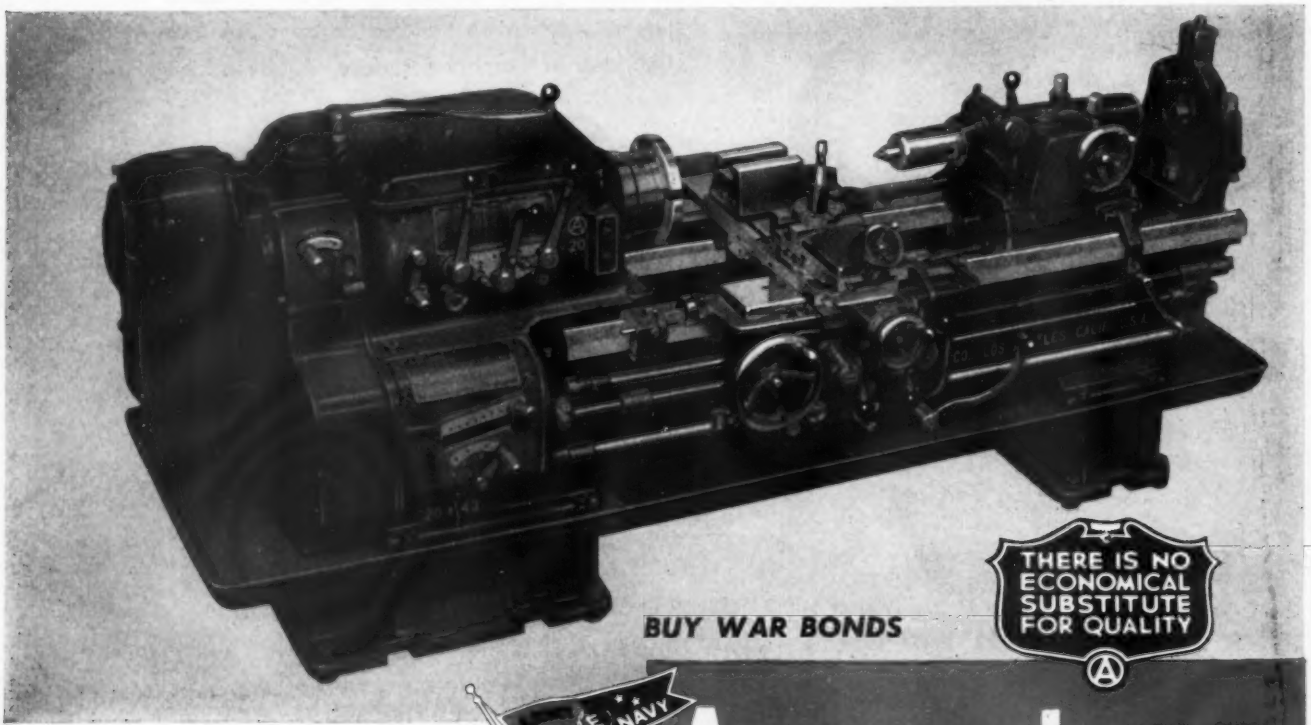



# Wheels of Progress

## TURN ON *Axelson-Turned* AXLES

Turned metal work is the hub and center of all mechanical operation. So when, for instance, you think of *axles,* think of *Axelson.* "Wheels of Progress" must turn on close tolerance axles, for these wheels must run true, and fast and unfailingly. *Axelson heavy duty Lathes* have been setting the pace for machine tool progress for over thirty years. Today, when machine tools mean so much in keenly competitive work, you can place your full confidence in the time tested *Axelson Lathe.* Quality counts and in the Axelson Lathe, now as always, you can *count on quality.*

*Axelson Lathes, of various lengths, are manufactured in* **14, 16, 18, 20, 25 *and* 32-*inch sizes.***



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THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

E NAVY

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**Dependable for over a Quarter Century**

**AXELSON MANUFACTURING COMPANY**

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# CARLTON *Radials*...

• Twenty-six years ago The Carlton Machine Tool Co. brought out the original low hung drive bringing the drive down underneath the arm driving off the large diameter of spindle closest to the work. This drive has proven not only theoretically correct but practically correct, and that with the other new features of the Carlton Radial Drill has proven itself through actual demonstration in customers' plants. One of the leading Radial Drills on the market today in this Country or any foreign country.

There are thousands of these radial drills being used by all the large leading manufacturing companies in the United States, as well as foreign countries. The upkeep and repair parts in the past 26 years has almost been nil.

The above photograph shows the variation and sizes that the Carlton Radial Drill is made from the small 9" column with 3' arm to 26" column with 12' arm, and are furnished with sizes in between column diameters 9", 11", 13", 15", 17", 19", 22", and 26". In arm lengths of 3', 4', 5', 6', 7', 8', 9', 10', 11', and 12'. Furnished with all types of bases: standard base, right angle base, double end base, three way base, four way base, and round base to enable loading the base while the operator is drilling. Also with either plain box or universal tables.

The following features speed production and help produce more work, faster at lower cost. Low hung drive to spindle—anti-friction bearings throughout—centralized controls—unit construction—oiling required only once in six months—all drive parts running in oil—power rapid traverse to head and electro hydraulic column lock.

If your work calls for a radial you will get greater production—greater economy—greater satisfaction from a Carlton. Representatives in all large cities.

ARMY E NAVY

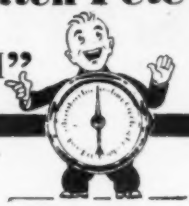
## THE CARLTON MACHINE TOOL COMPANY

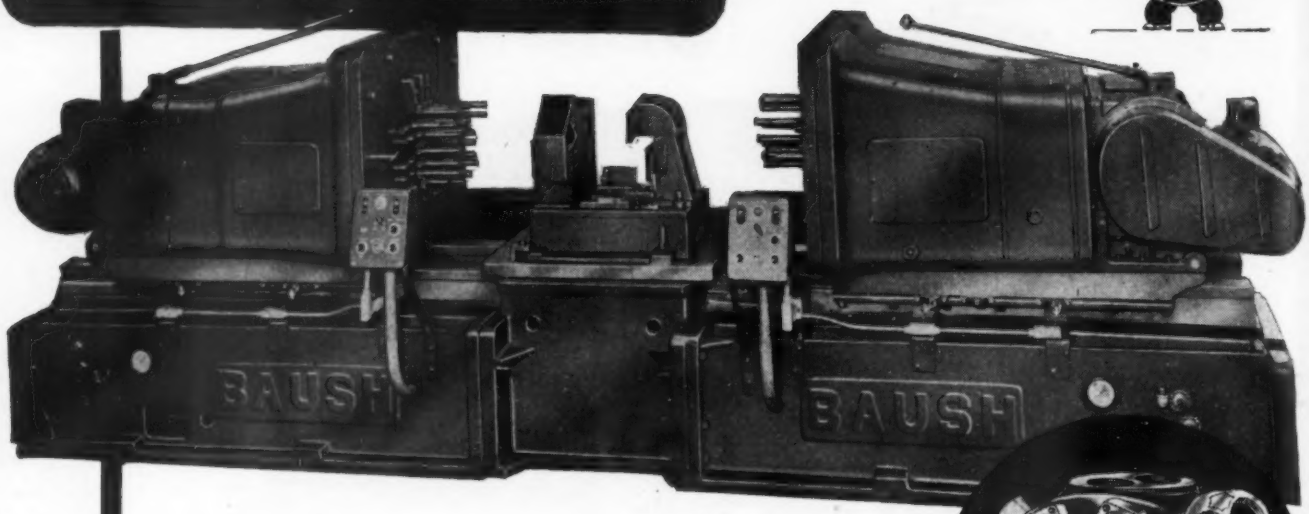
*Manufacturers of* RADIAL DRILLS *Exclusively*

CINCINNATI 25, OHIO, U. S. A.

# SPEED UP CIVILIAN *Necessities...*

**"Says Stop-Watch Pete of BAUSH"**





*Baush 2-way Type W-6 Horizontal Hydraulic Multiple Spindle Drilling Machine has two 18"x24" adjustable type joint driven heads with 18" maximum stroke for each head. Left head furnished with 22-1" diameter spindles—Right head with 16-1" diameter spindles—all with short dowelled arms mounted on support plates. Convenient push button controls permit operation of machine from either side.*

The Baush Machine Tool illustrated has just been completed for one of the largest manufacturers of air conditioning and refrigeration equipment to save TIME and speed up economical production of essential civilian equipment.

This machine is furnished with several size fixtures adapted for drilling holes in the pump and seal ends, and hand hole covers of various air conditioning and refrigeration crankcases.

Perhaps YOUR civilian production can be speeded up by special purpose Baush Machine Tools . . .

A wire, phone call or letter will bring our Engineers to your plant to discuss your problems—there's no obligation.

*Descriptive literature sent upon request.*

**BAUSH**

**MACHINE TOOL**

SPRINGFIELD 7, MASSACHU

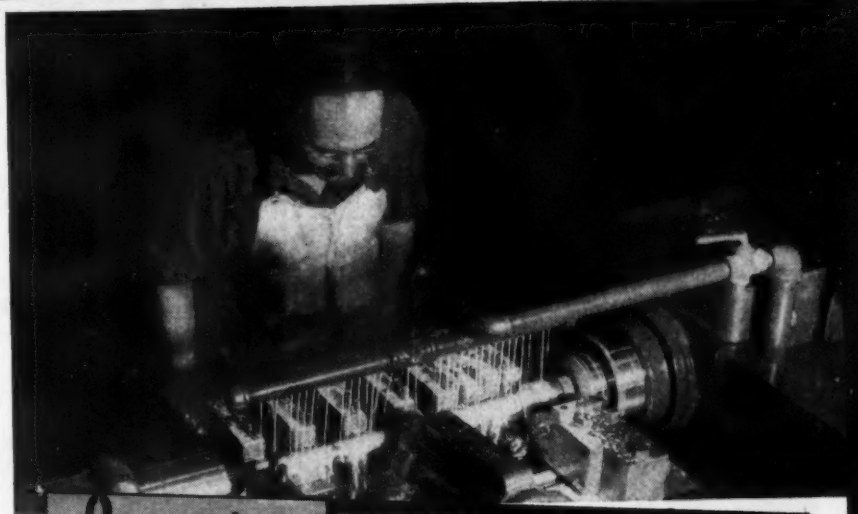
# HOW TO SAVE TIME TURNING LONG SHAFTS

## INCREASE PRODUCTION BY TURNING BOTH ENDS SIMULTANEOUSLY ON A SUNDSTRAND AUTOMATIC LATHE

Yes, the advantages of multiple tooling and automatic cycling can be applied to your long shaft work. It's simple on a Sundstrand. In most shaft work the turning operations are on both ends. With a short bed it is impossible to tool both ends. Consequently, each end must be turned separately. On a Sundstrand, two front, and two rear carriages can be provided so that work can be done on both ends of the shaft simultaneously.

## AMPLE POWER FOR MULTIPLE CUTS WITH MODERN CUTTING TOOLS

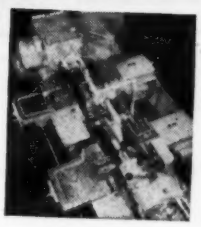
In addition to being supplied with ample horsepower for multiple cuts, Sundstrand automatic lathes are sufficiently powered so that cemented carbide and other modern cutting tools can be used to capacity.



## 3 examples of TURNING LONG SHAFTS

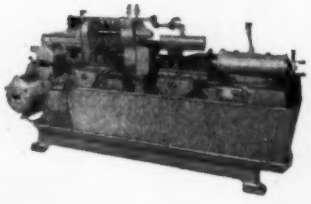
### 1. 60 INCHES BETWEEN CENTERS

This Sundstrand turns, faces and forms both ends of axle shafts simultaneously. Over twelve different sizes of parts are turned on this automatic lathe. In addition to increasing production, this machine replaced three single end type machines.



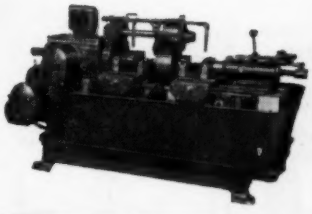
### 2. TURNING CAM SHAFTS

Turning and grooving operations on cam shafts are performed on this Sundstrand automatic lathe. A special center drive unit is provided along with special tooling for turning, grooving and chamfering four bearings and turning fit diameter.



### 3. 21 TOOLS CUT SIMULTANEOUSLY

Twenty-one straight shank H.S.S. tools turn these shafts (in one cut) to very close grinding tolerances. Actual tests indicated run out less than .003 inches. This long bed Model lathe is also provided with a center drive unit to facilitate machining.



## FREE GUIDE TO FASTER TURNING

This 44 page booklet, crammed full of technical data and other valuable information, shows how Sundstrand engineered production has been successfully applied to modern turning problems. Both long and short run turning jobs are included with factual tooling and production information taken directly from the field. Write for your copy today. Ask for bulletin No. 141.

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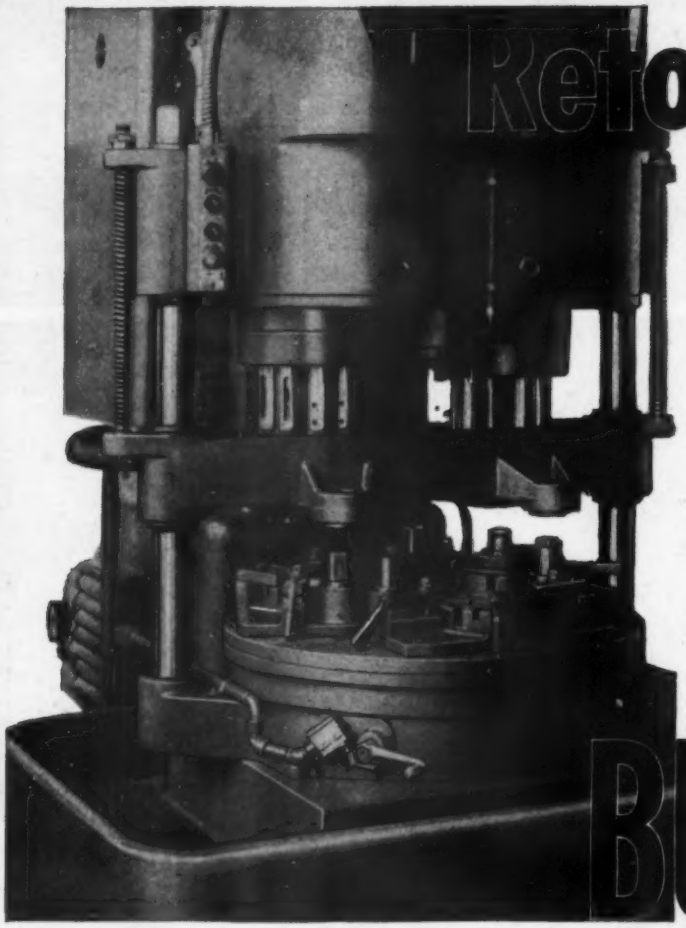

# Retooled by Buhr

## for Profitable Production

Typical of Buhr retooling is this Vertical Hydraulic Driller designed for mass production economy. It is a high speed machine consisting of:

1—16 SPINDLE DRILL HEAD • 1—BUSHING PLATE
1—HOLDING FIXTURE MOUNTED ON
1—30"—3 STATION INDEX TABLE

Safety devices prevent machine from operating until fixture is properly located.

BUHR DRILL HEADS ARE PRACTICALLY FRICTIONLESS. ALL GEARS ARE SHAVED AND INDUCTION HARDENED FOR QUIETER OPERATION, LOWER POWER CONSUMPTION, AND MORE HOURS OF TROUBLE FREE PRODUCTION.

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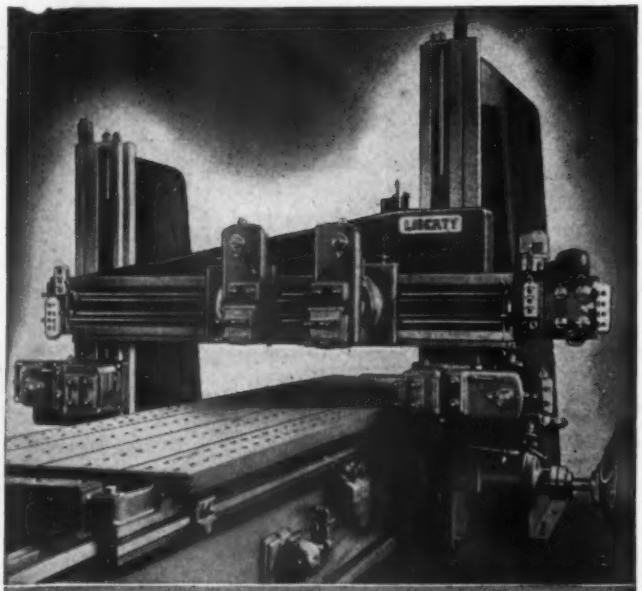

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**PLANERS**
FOR HIGH SPEED, LOW COST PRODUCTION

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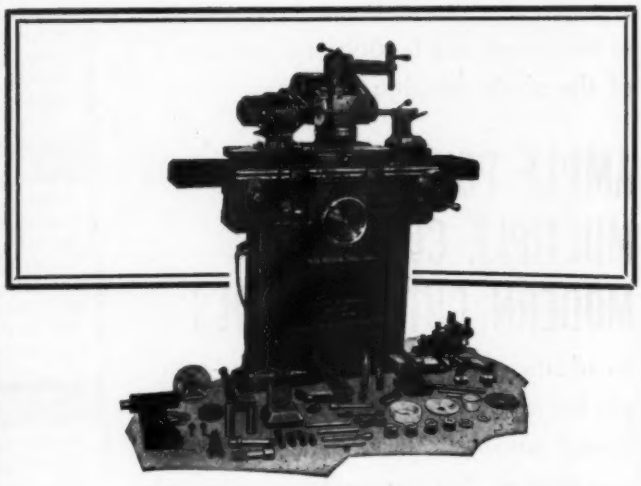
*Over a Quarter Century of Specialized Experience with Time Tested Principles of Design*



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*featuring:*

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- ball bearing table
- fixed table height
- one shot lubrication
- and many other important features

Illustrated Catalog containing complete details sent promptly on request.

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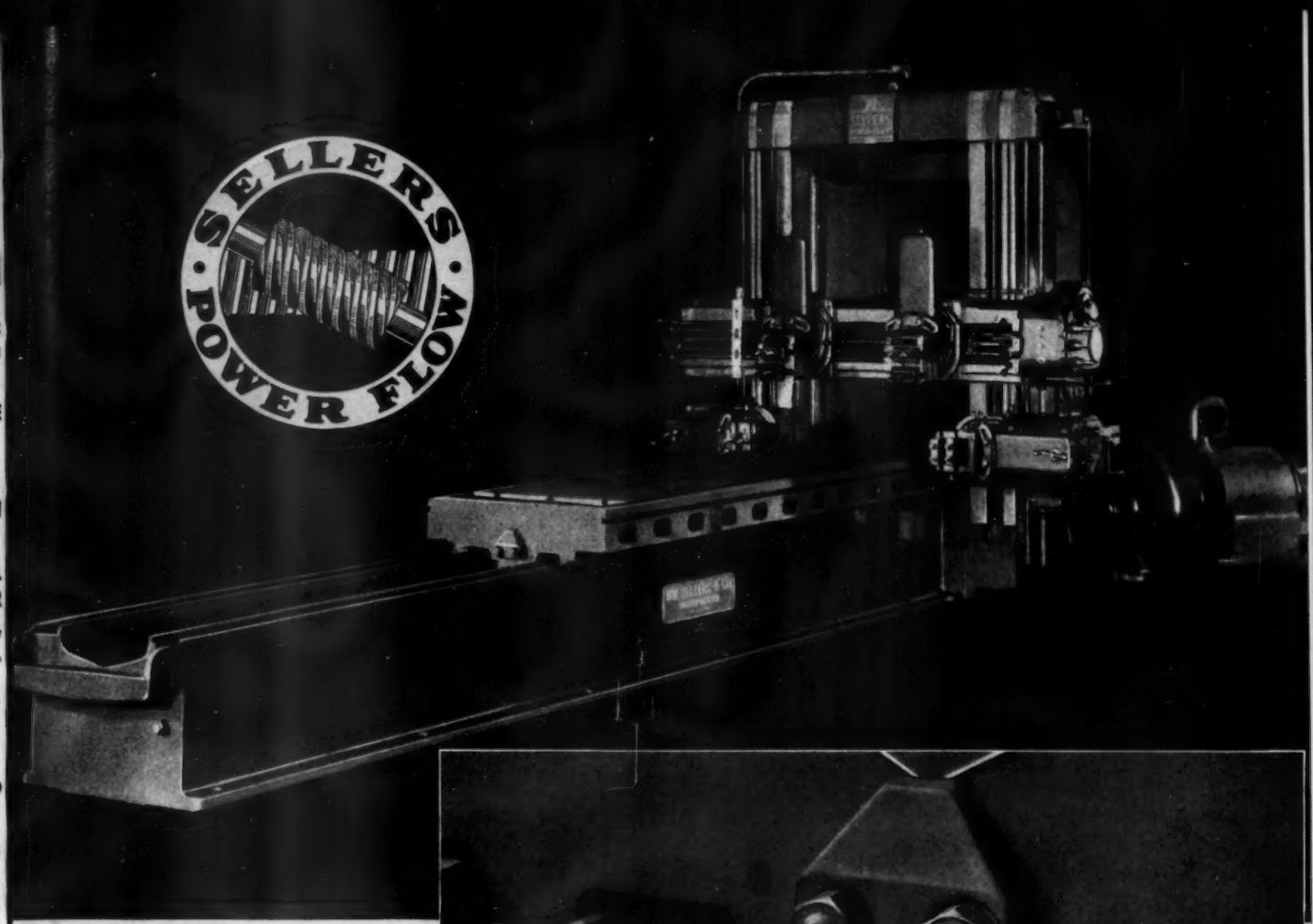
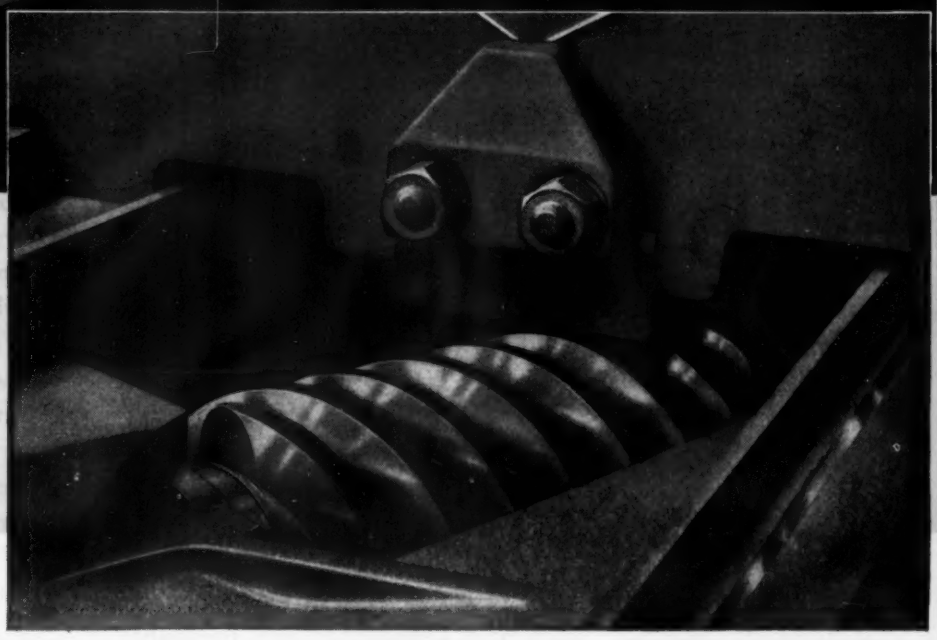
**330 STRAIGHT AVENUE**
**GRAND RAPIDS (4), MICH., U.S.A.**



## "It's the Principle of the thing"

Foremost among the many characteristics of Sellers Power Flow Planers which speed production, increase machining accuracy and lower operating costs is the Sellers Power Flow *principle* . . . A spiral gear drive which, throughout the life of the machine, produces a smooth, non-vibrant, never-varying flow of power.

This exclusive Sellers feature makes possible more profits for the planer user, because the spiral gear drive is simple, sturdy, smooth in action, insuring a finer and more accurate finish, with heavier and faster cuts.

The entire drive is mounted on anti-friction bearings. The table is driven through a smooth running rack, pinion and reduction gearing of balanced helical forged steel gears. The spiral gear has at least six teeth in mesh with the rack at all times and is designed to maintain this relationship through many years of service. This type of drive eliminates the necessity of an elaborate foundation for housing drive gears and shafts. Maximum efficiency of this drive is obtained by using the minimum adequate number of gears and bearings . . . The Sellers drive never wears out, but always wears in.

For complete details on the versatility and capacity of these machines, write for Power Flow Bulletin No. 1946.

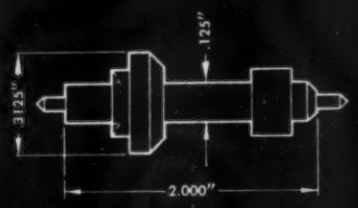
**WM. SELLERS & COMPANY**

1610 HAMILTON STREET • PHILADELPHIA, U. S. A.

**SELLERS** PRECISION TOOLS SINCE 1848

# Complicated Precision Parts Produced in

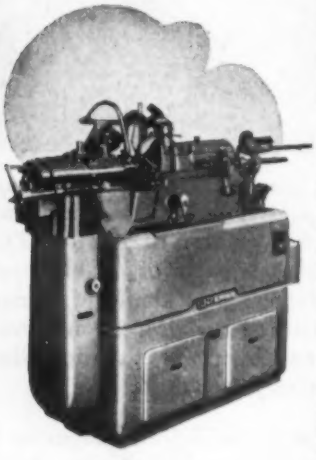
## ONE PIECE
on WICKMAN AUTOMATICS




## INSTEAD OF TWO
by Conventional Production Methods

On Wickman Automatics, many complicated parts can be produced COMPLETE which could otherwise be manufactured only by assembling two or more parts made by conventional screw machines and second-operation work. In addition to obvious savings in time, labor and equipment costs, the Wickman method permits greater accuracy, finer finish and reduced scrap loss.

Through synchronized advance of the bar stock past five radially-operated single-point tools, Wickman Automatics turn pivot points and tapers of any angle, multiple diameters, back shoulders, recesses and irregular contours in a single operating cycle. The work is rigidly supported at all times by a guide bushing a few thousandths from the tools, permitting high finish and extreme precision on long, slender work.



Wickman Automatics are available in two sizes—the No. 1 machine, of 5/32" chuck capacity, and the No. 2 (illustrated) of 1/2" capacity. Both machines have ample speed and rigidity to permit full use of tungsten carbide tools, and a complete line of attachments is available. Illustrated bulletins giving full details will be furnished on request.

The benefits of Swiss Type Automatic production are now available to any manufacturer. In most of the major industrial areas, companies are established to do this type of work on a contract basis. They are equipped with Wickman machines to handle all of the production required by some customers, and to supplement the production of others who have Swiss Type automatics in their own plants.

If you are looking for a source of Swiss Automatic parts, we will be glad to put you in touch with a thoroughly dependable contract manufacturer in your locality.

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SPECIALISTS FOR OVER 50 YEARS IN

## Tracer-Controlled MILLING

*8 mm. movie camera case profiled in large quantities*

### TRACER CONTROL Proven FASTER METHOD FOR HIGH PRODUCTION PROFILING

**High Accuracy and Finer Finish Maintained . . . Production Doubled**

An American camera manufacturer found the Gorton Duplicator the ideal machine for high production profiling of both seat for cover and film tract clearance of camera cases, holding tolerances of ±.003". Gorton high spindle speeds produced the required fine finish.

SIMPLE HEAT-TREATED MASTER determines cutter path. For high production, pneumatic clamping provides easy loading and unloading and simultaneously regulates flow of coolant.

On jobs like this, the Gorton Duplicator permits any reasonably good operator to perform satisfactory work, maintaining high accuracy, comparable to results of highly skilled mechanics on special production equipment.

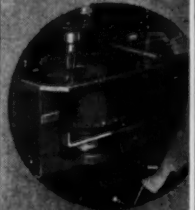
**PRODUCTION DATA**

**Operation**—Profiling to fine finish.
**Material**—Aluminum alloy.
**Speed**—4,000 r.p.m.
**Feed**—Manual.
**Production**—30 per hour.
**Previous Method**—15 per hour.

### GORTON ENGINEERING SERVICE, FREE

Investigate the possibilities of the Gorton Duplicator as the practical, economical solution to your high production profiling problems. Gorton engineers who have specialized for 50 years in the development of tracer-controlled milling will give you their recommendations without obligation. Submit part, prints or specifications to your Gorton dealer, or Factory at Racine, Wis.

**The Right Size The Right Type of Machine for Every Job.**
From 2 oz. to 2 Ton



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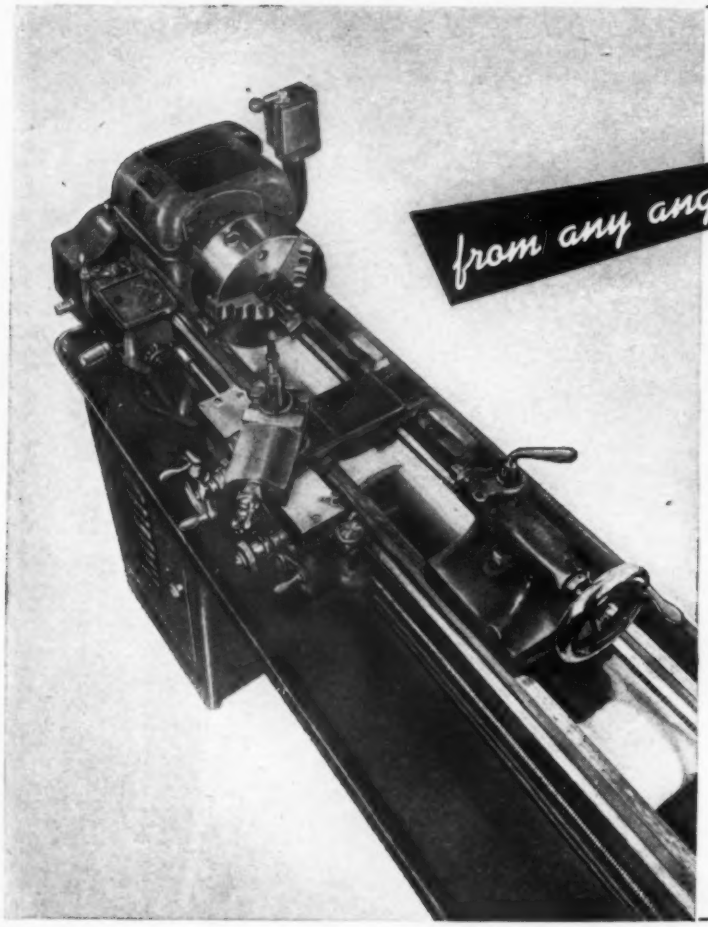


# SHELDON

## S-56 LATHE

. . . compare a SHELDON S-56 Precision lathe with all other 10" lathes in the moderate priced field, and you'll find more accuracy, more capacity, more convenience, more design, more quality . . . *from any angle just more lathe.*

The SHELDON S-56 lathe has a bed length of 56", with rigid T-girted bed with 2 V-ways and 2 Flat ways which are ground and hand scraped to .0005" of both lateral and parallel alignment. Lead screws are cut on the finest Pratt & Whitney "super precision" lead screw machine. The S-56 lathe with 56" bed is mounted on a rigid 5 drawer steel bench (S-44 with 44" bed on a 4 drawer steel bench) which houses an efficient 4-speed (8 spindle speed) underneath motor drive. Each come with full quick change gears, power longitudinal and cross feeds and standard big lathe features.

- Heavy bronze bearings
- 1" Collet capacity
- 11¼-inch swing
- Double-walled apron
- Large hardened and ground spindle
- Extreme accuracy
- Convenient controls
- Underneath V-belt motor drive
- All Steel Bench

**SHELDON MACHINE CO., INC.**

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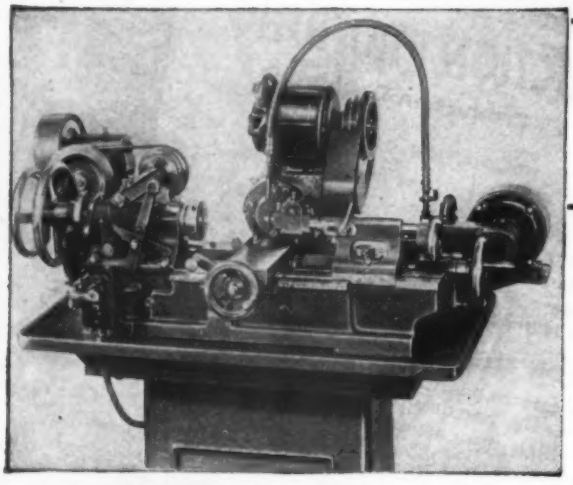
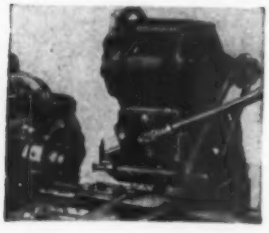
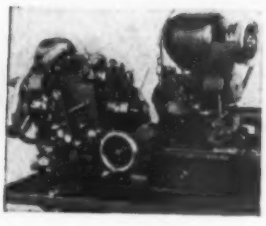
*Builders of Good Lathes Since 1919*





*(Left)—Waltham Thread Miller equipped with Internal Threading Attachment.*



*(Below)—Waltham Thread Miller equipped with Relieving Head.*

# WALTHAM THREAD MILLERS

***provide versatility and precision in small thread production***

Designed especially for small work calling for close tolerances, WALTHAM THREAD MILLERS can be depended on to meet the most exacting specifications for precision parts.

An outstanding feature of these improved machines is the use of three motors, one each for driving cutter, work and pump. Machines can be arranged with speeds suitable for brass or steel or both. Motors are wired so that a single start and stop station will control all at one time.

Standard equipment includes three motors with control, follow rest, milling cutter, indexing device, 5 pitch lead screw and change gears for cutting from 5 to 40 threads per inch.

A wide range of special equipment is available and greatly enlarges the usefulness of this machine. Full details on request. Write for Bulletin 244A.

### CONDENSED SPECIFICATIONS

Swing over carriage—3"
Dia. work handled—2" or smaller
Thread length (work held on centers) —8¾"
Thread length (work held in chuck)—10"
Max. Dist. between centers—12"
Floor Space—48"x34"
Net Weight—850 lbs.

WALTHAM
TRADE MARK REGISTERED U.S. PAT. OFF.

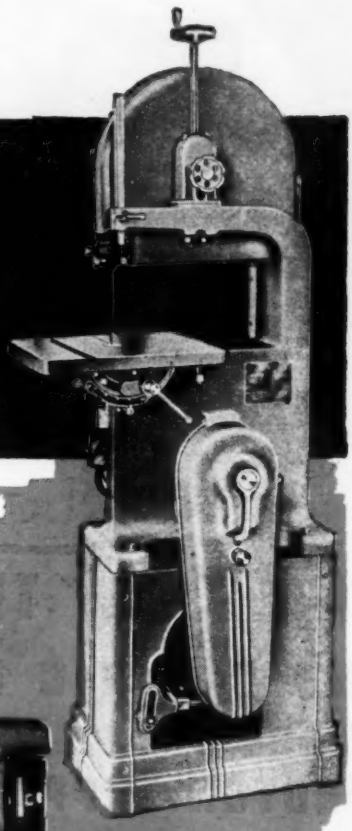
**WALTHAM**
**MACHINE WORKS,**
**WALTHAM, MASS.**

# KEEP YOUR PRODUCTION "LIGHT ON ITS FEET"!

## Speed Up Tooling Shifts With

# Walker-Turner

## MACHINE TOOLS



Walker-Turner Light Machine Tools reduce your re-tooling problems to a minimum. Here's why:

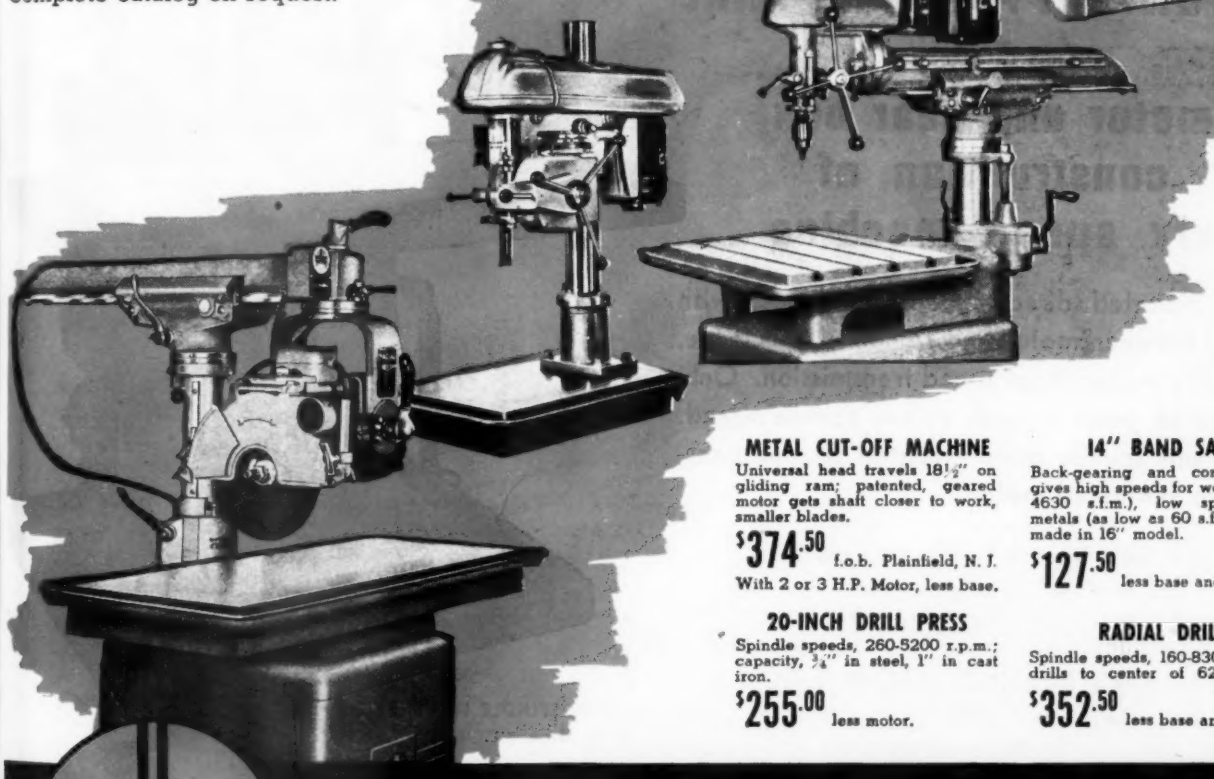
(1) Quickly shifted from one operation to another.

(2) Ideal for special tooling set-ups—precluding need for high-priced special machines of limited usage.

(3) Rugged, safe and simple to operate.

(4) Low in price and in power consumption.

Complete catalog on request.



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$374.50 f.o.b. Plainfield, N. J.

With 2 or 3 H.P. Motor, less base.

**20-INCH DRILL PRESS**

Spindle speeds, 260-5200 r.p.m.; capacity, ¾" in steel, 1" in cast iron.

$255.00 less motor.

**14" BAND SAW**

Back-gearing and cone pulley gives high speeds for wood (up to 4630 s.f.m.), low speeds for metals (as low as 60 s.f.m.). Also made in 16" model.

$127.50 less base and motor.

**RADIAL DRILL**

Spindle speeds, 160-8300 r.p.m.; drills to center of 62" circle.

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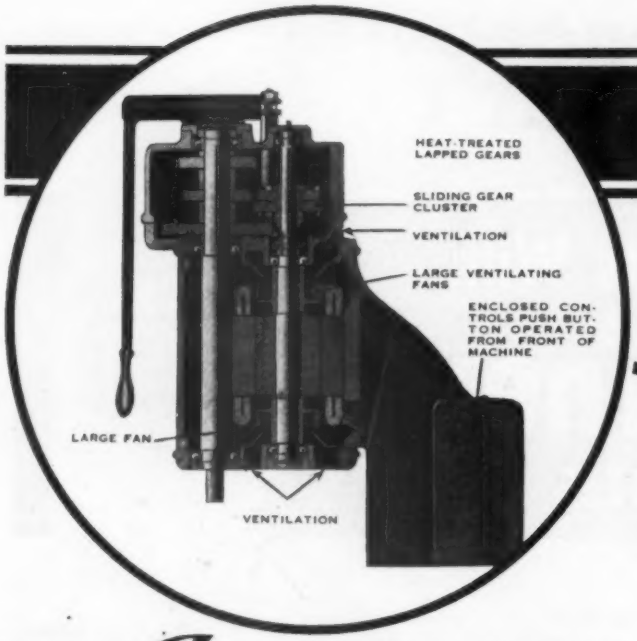
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT-OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS




## Avey FEATURE No. 2

# THE Avey TYPE MA-6

## AVEY-MATIC POWER FED HAND FEED AND REVERSING MOTOR TAPPING MACHINE

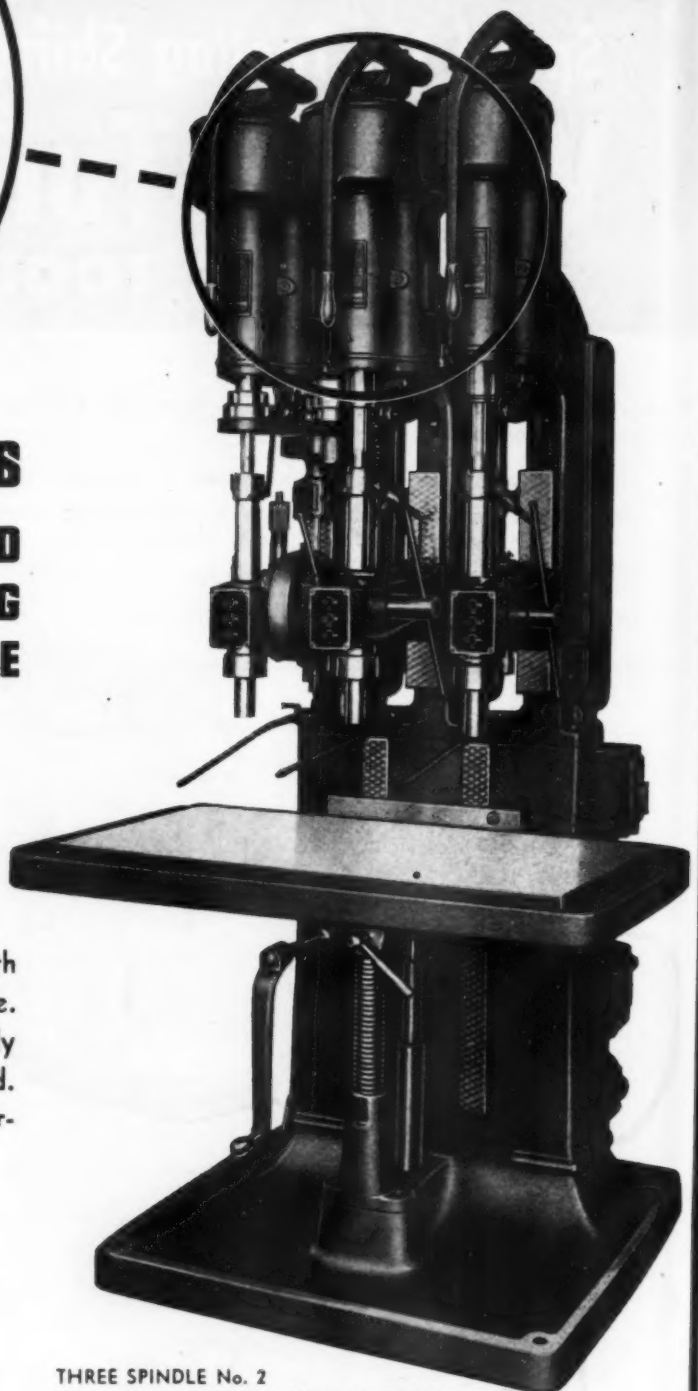
*features*

### motor and gear box construction of six speed machine

Motor mounted directly back of spindle with gearing between motor and spindle drive sleeve. Two speed motor, three speed transmission. Only one pair of gears in mesh at any spindle speed. Motor and spindle drive mounted on ball bearings, fan ventilated motor.

Type MA-6 is made in following capacities:
No. 2 — 7/8" capacity in cast iron.
No. 3 — 1 1/4" capacity in cast iron.

THE AVEY DRILLING MACHINE CO.
CINCINNATI • OHIO • U. S. A.



THREE SPINDLE No. 2
TYPE MA-6 • COMBINATION MACHINE
1st Spindle - Avey-matic Feed
2nd Spindle - Hand Feed
3rd Spindle - Tapping (Reversing Motor)

# Greater Versatility

## WITH THESE GEMCO SHAPER ATTACHMENTS

### SUPPLEMENTARY TABLE

Its use increases range, and size of work pieces which can be handled.

### TILTING TOP

Used for angular work pieces, thereby eliminating complicated set-ups.

In 16", 20", and 24" Sizes

### INDEX CENTER

Used for dividing operations required in splining, fluting, gear cutting, and squaring shafts.

### EXTENSION HEAD

Its use makes possible the machining of surfaces otherwise inaccessible. When used in conjunction with special tool head body, concave attachment, and power down-feed mechanism, concentric concave circular surfaces can be machined.

**Other Attachments Include:**

Down Feed to Head
Double or Single Screw Vise
Mould Maker Vise
Power Rapid Traverse

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*Exclusive "LUBRIGARD" Safety Device*
*Increases the Precision Life*

**GENERAL ENGINEERING & MFG. CO.**
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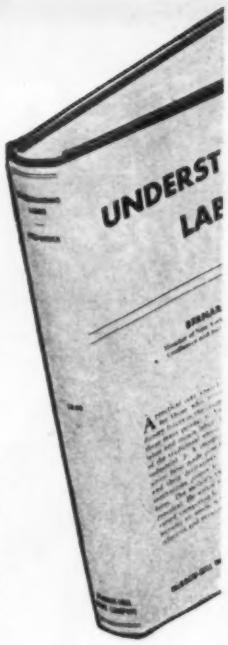
MANUFACTURERS OF PRECISION MACHINERY SINCE 1917

Write today for Bulletin GC-12A

*Giving you . . .*
## an inside view of organized labor

**An examination of labor institutions for the basis of a firm peace on America's labor front**




Now, when management, union representatives, labor itself, are straining for rightful recognition, when new labor laws are being framed, when free enterprise is undergoing its mightiest test comes a startling new analysis of the shape of labor institutions—a "bare-bones" revelation of all the elements, conflicts, forces, the organizing techniques and individual aims which characterize the mighty unions controlling American labor. Here is a book which attempts to recognize the wrong terms and fallacies which have made trouble in the past, and erect a firm, workable principle of union organization and representation, and labor legislation for the future.

*Just Published!*

# UNDERSTANDING LABOR

By BERNARD H. FITZPATRICK

Member of N. Y. Bar; Industrial Relations Director, Commerce and Industry Association of New York, Inc.

**175 pages, 5¾ x 8¾, $2.00**

McGraw-Hill Industrial Organization and Management Series

A thorough examination of labor unions in this country, studying the fundamental purposes and organizing methods, analyzing the principal types of unions, discussing the positive and negative aspects of the Wagner Act, and laying bare the conflicting strains and forces, the misconceptions and cross-purposes, which do much to keep American labor in unrest. Here are the fundamental, unalterable truths around which may be built a practical, workable scheme of management-union-worker relationship, and sound, realistic labor laws.

● Digs down to the essential structure of each type of union organization, revealing many of the fallacies of present labor legislation, unfair union practices, unrepresentative union dealings . . . and the significance of many union rules incomprehensible to the outsider.

● Brings to life significant factors in America's labor history, so that the reader will have a clear idea of the origin of contradictory and conflicting forces at work today—such as The National Industrial Recovery Act, and its efforts to corporate the entire reservoir of labor.

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The Corporate State
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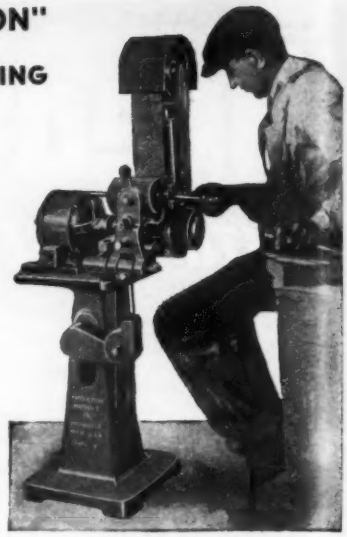
*Assures high speed, fine, uniform finish*



The type S Machine will handle cylindrical work from ¼" to 1" in diameter. Parts may be fed through the machine automatically by the Centerless Feed Attachment. No centering or chucking is required.

This machine may also be used for flat or irregular work by hand manipulation, the surfacing belt being easily swung into a horizontal position for this purpose.

Anything that can be ground or polished . . . metals, rubber, fibre, wood . . . can be finished with unskilled labor on this versatile machine.

**SPECIFICATIONS**

Abrasive belt . . . 4" wide, 60" long
Motor . . . 1 H.P., 1750 R.P.M.
Belt Speed . . . 3200' per min.
Table . . . 4½" x 13½"
Ball bearing equipped

*Write for illustrated literature giving complete details.*

**PRODUCTION MACHINE CO.**

Manufacturers of Drilling Machines, Tool Grinders and Hand and Automatic Polishing and Grinding Machines.

**GREENFIELD, MASS., U. S. A.**



**Whoever thinks of hardness testing equipment thinks of the**

**"ROCKWELL" HARDNESS TESTER**

*Now and always made only by*

**WILSON**

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*There's a*
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service man in your vicinity, but you probably will never need him.

*MOTOR SPINDLE DRILLING MACHINES 1 TO 6 SPINDLES*

**LELAND GIFFORD**

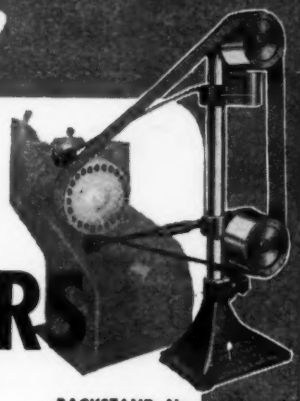
WORCESTER, MASSACHUSETTS

# Hammond

## OF KALAMAZOO

Wet-N-Dri 4" belt model — Type 400

# Abrasive Belt GRINDERS-POLISHERS

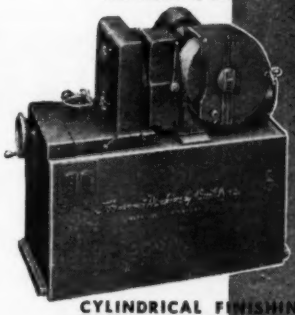


BACKSTAND No. [illegible] (shown) see Model 3 left column

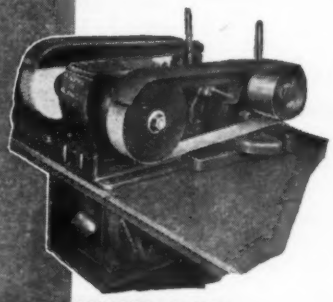
### FOR FASTER, BETTER FINISHING

**Here Hammond offers you the machines for doing a better grinding and finishing job with abrasive coated belts. They are built to the highest standard of machine tool construction and provide low cost, high production units for the particular job to be done. Whatever your problem . . . investigate the available Hammond machine for handling it.**

Flexible Belt Unit, 2" type F-2



CYLINDRICAL FINISHING UNIT — Model OD-2 shown



GRINDER-POLISHER COMBINATION — Use either belts or wheels or both, 3" belts

**FLEXIBLE BELT UNIT** — Inexpensive bench or pedestal type for replacing the slow, more costly grinding and finishing methods now being employed throughout your plant.

**GRINDER-POLISHER COMBINATION** — Uses belts or wheels or both on same machine, whichever set up is required to do the job. Availible in bench and floor types.

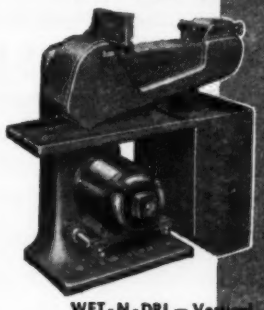
**BACKSTAND-POLISHING LATHE UNITS** — handles heavy duty finishing jobs faster . . . better.

**BACKSTANDS** — Either bench or floor types for converting your present Polishing equipment into belt finishing units.

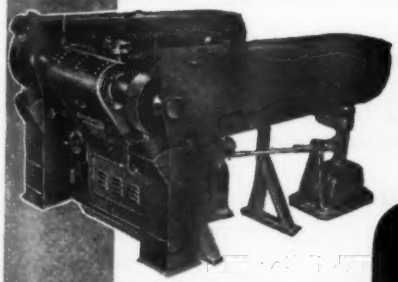
**CYLINDRICAL FINISHING UNITS** — for ¼" to 9" outside diameter tubes, rods, bars.

**WET-N-DRI** 4" and 6" Horizontal-Vertical GRINDERS, either bench or floor type units for high production, low cost finishing.

**HEAVY DUTY** — 8" and 10" Vertical floor type GRINDERS — Wet-n-Dri operating, handle wide range of small and large parts to be finished.

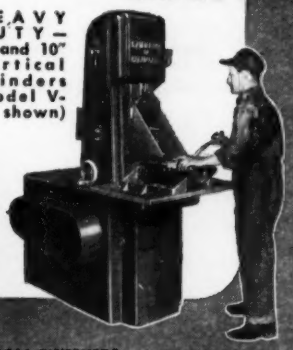


WET-N-DRI — Vertical and Horizontal 6" Grinders



BACKSTAND No. 3 and Hammond Variable Speed Polishing Lathe Unit

HEAVY DUTY — 8" and 10" Vertical Grinders (Model V-10 shown)



Hammond Machinery Builders INC.

OTHER HAMMOND PRODUCTS — CARBIDE, GENERAL PURPOSE & ABRASIVE BELT GRINDERS • AUTOMATIC & CYLINDRICAL FINISHERS • POLISHING LATHES

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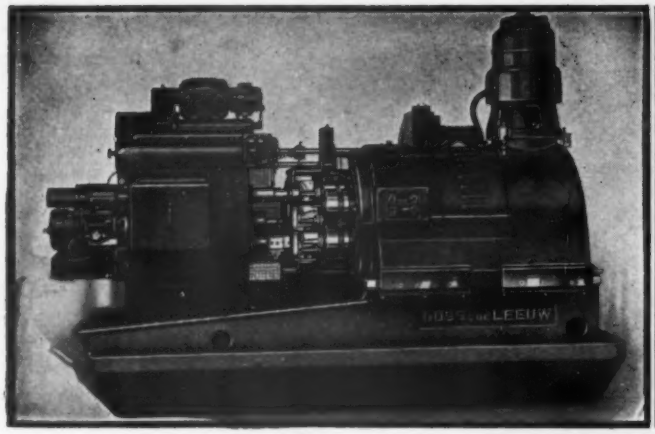

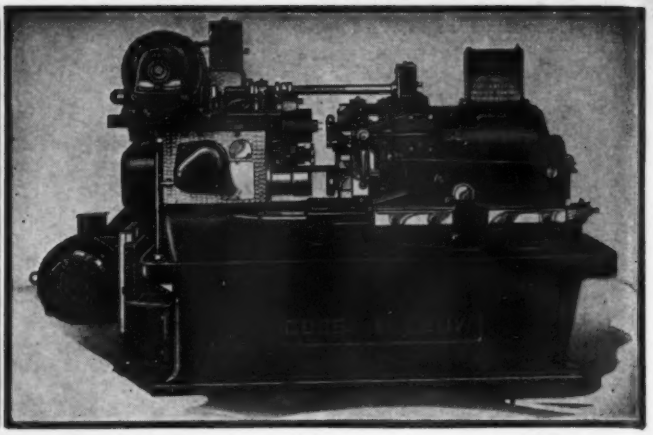

**WORK ROTATING TYPE**

5 Spindles
6 Spindles
8 Spindles

# GOSS & DE LEEUW *Multiple Spindle* CHUCKING MACHINES

**TOOL ROTATING TYPE**

4 Spindles
5 Chucking Positions

On these machines, two threading operations can be handled simultaneously, each thread controlled by its own lead screw.

Among the many other modern features offered in both types are: pre-loaded anti-friction spindle bearings, hardened ways, oversize spindles and gears of chrome-nickel steel, heat-treated.

Complete details will be found in descriptive catalog available on request.

**GOSS & DE LEEUW MACHINE CO., NEW BRITAIN, CONN.**

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*Automatic* DRILLING - BORING MILLING - TAPPING *Units*

**½ to 20 HORSEPOWER DRIVE**

**AUTOMATIC and SEMI-AUTOMATIC PRODUCTION MACHINERY**

**W. K. MILLHOLLAND MACHINERY CO.**
Indianapolis, Ind.

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# ABRASIVE

ACCURACY BOOSTS PRODUCTION

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| **No. IG** | INTERNAL GRINDER | **No. 34** | VERTICAL SPINDLE SURFACE GRINDER |
| **No. 1½** | HAND FEED SURFACE GRINDER | **No. 3B** | AUTOMATIC FEED SURFACE GRINDER |

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**ABRASIVE MACHINE TOOL CO.**
EAST PROVIDENCE 14, RHODE ISLAND

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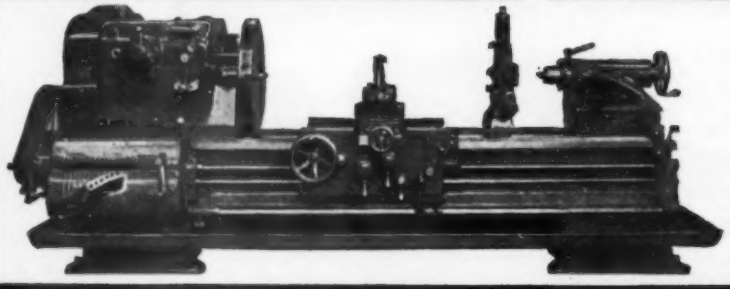
# SPRINGFIELD GEARED HEAD LATHES



***for peacetime or war production!***

A lathe purchased now, for round-the-clock war production, must still meet peacetime requirements. Therefore, specify SPRINGFIELD lathes —flexible, efficient, ideal for emergency or normal production. SPRINGFIELD lathes are built in sizes from 14" to 30". Write for descriptive bulletins, prices, deliveries, etc.

*The* SPRINGFIELD MACHINE TOOL COMPANY • • • SPRINGFIELD, OHIO, U.S.A.

# Start Right IN RECONVERSION!

Change-over time is the ideal house-cleaning time to get rid of worn-out, inadequate or make-shift machines! In swinging into production on new civilian products... *start right* with the *accuracy* and *cost-cutting dependability* of Kent-Owens Milling Machines!

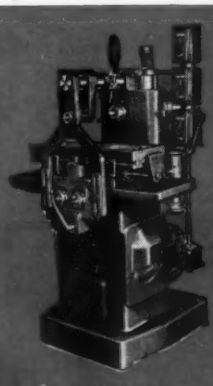
These are the machines preferred by shop men for speedy, practical and efficient production. Rugged... simple... adaptable to a wide range of work for the job ahead in reconversion. Write for latest bulletins.

Kent-Owens Machine Company, Toledo, Ohio.

**No. 1-14...32" x 9" table...14" table travel.**

# Specify KENT-OWENS Milling Machines

**No. 1-V...** Hydraulic vertical head feed ... 5½" head travel ... 25" x 9" table.



**No. 1-8...** 8" table travel ... 25" x 9" table ... full automatic hydraulic table feed.

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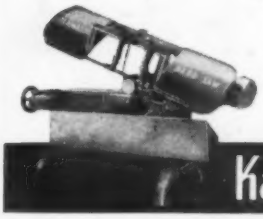
Now—it is possible to cut metal to lengths with phenomenal speed. The ONLY built-in, off-the-floor coolant Model Band Saw that combines portability, convenient operation and which has a "dripless" enclosed band saw frame.

Triples production—lengthens life of saws—makes heaviest cuts on hardest metals at production speeds. The SAW of advanced design with EXCLUSIVE FEATURES.

*Write for Bulletin or Ask your Dealer.*



**Machine Tool Division**

**Kalamazoo Tank & Silo Co.** **Kalamazoo 16, Mich.**

IN CANADA—BRIDGE MACHINERY CO., MONTREAL

**Kalamazoo *Metal Cutting* Band Saw**



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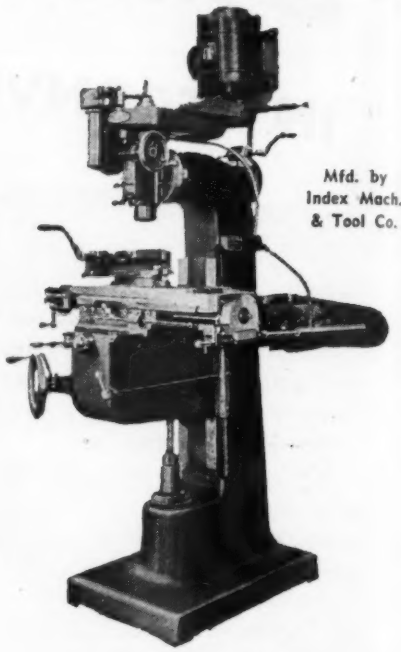

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A quality tool for precision work in the tool room or production line, incorporating such features as ball bearings—hardened and ground worm—quick acting throw-out for free hand turning—single movement table lock that does not cramp table out of alignment—compound trough. 12" size only.

For use on Index Mills or any other machine that will accommodate a 12" table.

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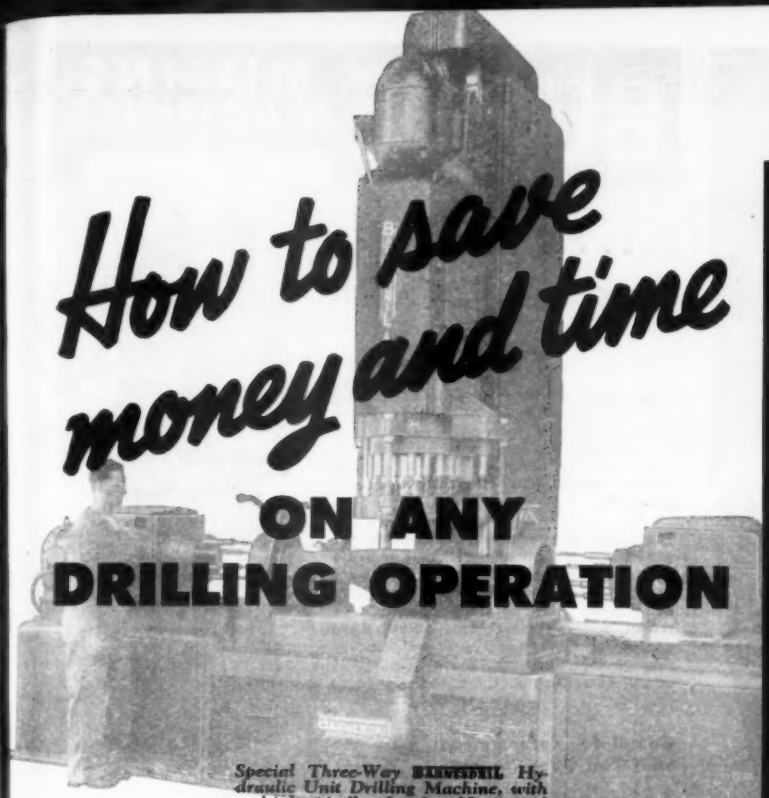

*Special Three-Way* BARNESDRIL *Hydraulic Unit Drilling Machine, with multiple-spindle heads. Horizontal Units carry an 8-spindle auxiliary head; vertical Unit carries 18-spindle auxiliary head.*

## HIGHER PRODUCTION AND LOWER COSTS EASILY ACCOMPLISHED WITH BARNESDRIL MACHINES

● An analysis of your *drilling, boring, reaming* or *tapping* operations will indicate that BARNESDRIL Drilling Machines accomplish worthwhile savings in time and money on metal working jobs.

Designed specifically for light and medium, heavy-duty and progressive drilling, the complete line of BARNESDRIL Machines includes Self-Oiling, All-Geared Production Drilling and Tapping Machines, with multiple speeds and feeds for general purpose drilling or with multiple spindles or special tooling arrangements for production drilling.

Whatever your drilling requirements, every BARNESDRIL Machine is designed and constructed to do a specific job and do it in the best way possible . . . with increased production and lowered operating costs.

BARNESDRIL engineers will suggest the proper BARNESDRIL machine for your specific drilling jobs—without cost or obligation. They will show you how to adapt standard machines to special drilling applications if you will send blueprints and complete information for their study.

### *Check* THESE SPECIFICATIONS FOR YOUR DRILLING JOBS . . .

LIGHT and MEDIUM DRILLING . . . Single and Ganged BARNESDRIL Self-Oiling, All-Geared Machines. Capacities of 1″ to 2″ in steel.

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HEAVY DUTY WORK . . . BARNESDRIL Hydram Machines with single-spindle, ganged, and multiple-spindle arrangements Up to 4″ in solid steel.

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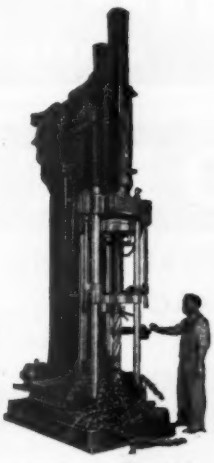
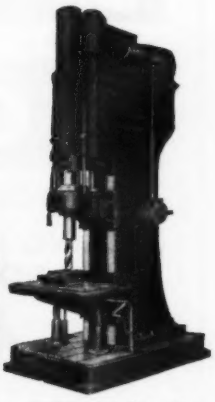
PROGRESSIVE DRILLING (drilling, reaming and tapping operations in sequence) . . . BARNESDRIL All-Geared, Hydram and Hydraulic Production Units. Can be arranged in horizontal, vertical or angular position for work requiring capacities of ½″ to 4″ in steel.

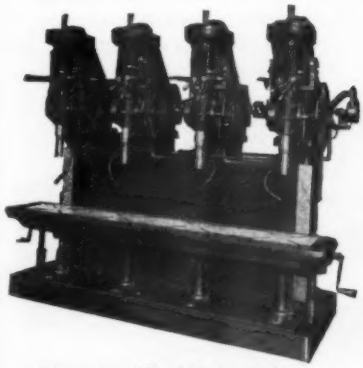
BARNESDRIL *No. 262 Sliding Head Machine*



BARNESDRIL *No. H-4 Hydram Inverted Drill*

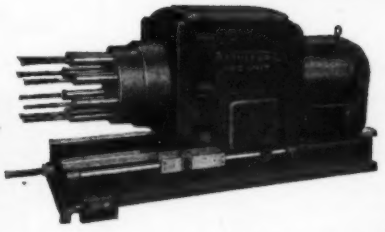


BARNESDRIL *No. H-4 Hydram Machine*



BARNESDRIL *No. 242 Box Column 4-Spindle Gang Drill*

BARNESDRIL *No. 201¼ Square Column Drill*



BARNESDRIL *Standard Hydraulic Units for special operations. Standard units can be combined in any vertical, horizontal or angular grouping to produce special production machines for drilling, tapping, reaming, boring or facing operations.*

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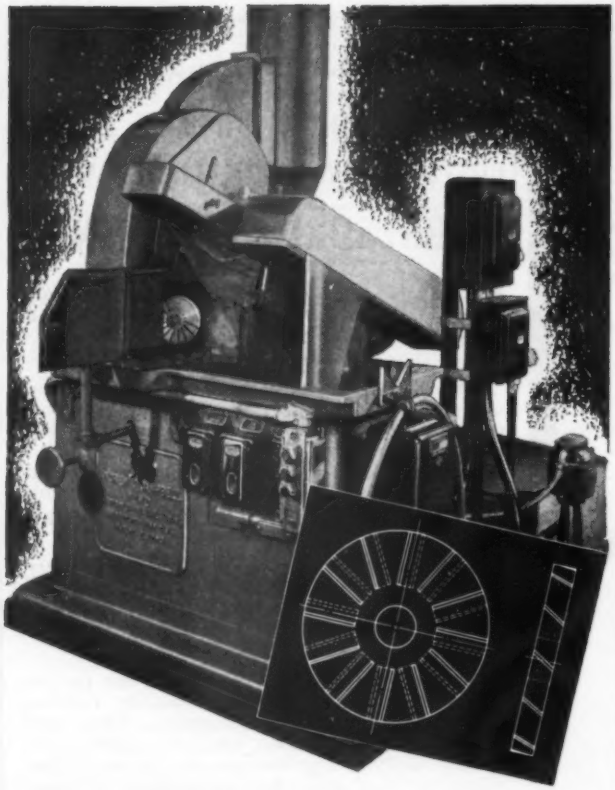


# CUTTING PRODUCTION TIME

## *FROM MINUTES TO SECONDS*

**PROBLEM:** To cut angular slots in a disc 8″ in diameter, approximately 1¼″ thick, going in from the periphery (see sketch). The material was heat-resisting stainless steel. The way the manufacturer was doing this job required a larger battery of machines to meet production requirements and it would take minutes to make each cut.

**SOLUTION:** A **CAMPBELL MODEL NO. 401 CUTAMATIC WET ABRASIVE CUTTING MACHINE** was rearranged to receive an automatic indexing fixture which compensates for wheel wear and depth of cut. The time required for cutting each slot (approx. 2 sq. in.) is 15 seconds. One operator can run all machines required for full production schedule.

★ ★ ★

Unusual? Yes. We are constantly adapting **CAMPBELL ABRASIVE CUTTING MACHINES** to do unusual jobs—or to do ordinary jobs faster, better or at lower cost. Perhaps we could solve a cutting problem for you. We'll be glad to talk it over.

*Campbell*

***ABRASIVE CUTTING MACHINES***

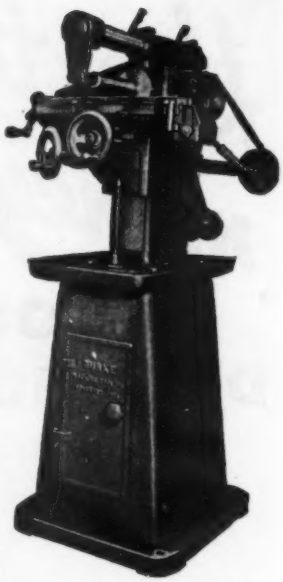
**ACCO**

ALSO MAKERS OF A COMPLETE LINE OF NIBBLING MACHINES

ANDREW C. CAMPBELL DIVISION
AMERICAN CHAIN & CABLE · BRIDGEPORT, CONN.

# BURKE MILLING MACHINES

## *. . . Put Your Small Work on a Production Basis!*



**Those small, difficult jobs can be handled on a *production basis* with BURKE Motor Driven Milling Machines Nos. 1, 2, 3, & 4. Primarily, this is because BURKES have been *specially designed and built* to do smaller milling jobs efficiently and economically.**

**Then, too, a number of attachments are available . . . attachments that increase the units usability, and add to your productivity. These include a vertical milling attachment, index centers, and vises—3 types, including swivel base. Now, when production must be stepped up, is the time to investigate the profit possibilities of BURKE Milling Machines, as applied to your work.**

***Complete Information Will Be Sent You Upon Request — Write!***

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# PORTAGE

## HORIZONTAL BORING, DRILLING AND MILLING MACHINE NO. 4

• Featuring an extended saddle and table with outer rail support for maintaining exceptional accuracy on long work. Get fully acquainted with the many features of this modern Boring Mill. *Ask for a copy* of our new instructive bulletin which points out the numerous advantages of this new Horizontal Boring, Drilling & Milling Machine.

**THE PORTAGE MACHINE CO.**
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# *Knock-Out*
# UNIVERSAL TOOL GRINDERS
# *ARE READY...*

MULTIPLE SPEED
UNIVERSAL TOOL GRINDER

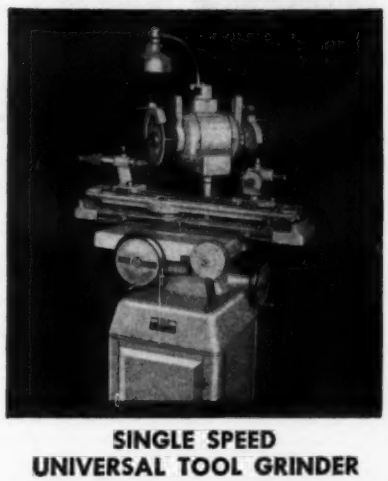
## *For postwar production and maintenance too . . .*

Ready! Yes, ready to serve on the tremendous job which is still ahead. When the war began *Knock-Out* Tool Grinders were ready and served their country and Allied Nations well. Now, as reconversion becomes a reality *Knock-Out* Grinders are once again ready to take their place on the production line and on tool maintenance work.

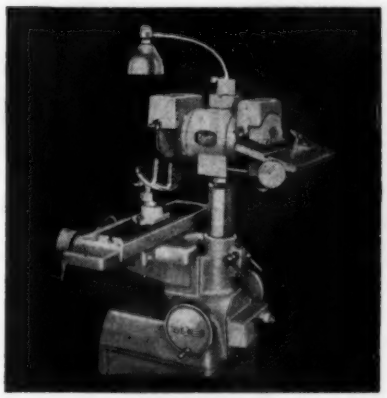
A product is no better than the tools with which it is cut and shaped. Keep those tools sharp and keep them right! Whether you're using high speed steel or carbide tipped cutting tools, there is a K-O Grinder built to accommodate your needs. The low original cost and negligible upkeep on *Knock-Out* Grinders makes hiring others to do cutting tool maintenance highly impractical.

*Knock-Out* Engineers have made available more time-tested grinder fixtures than has any other manufacturer. If it can be done—it can be done more easily and economically on a K-O Grinder.

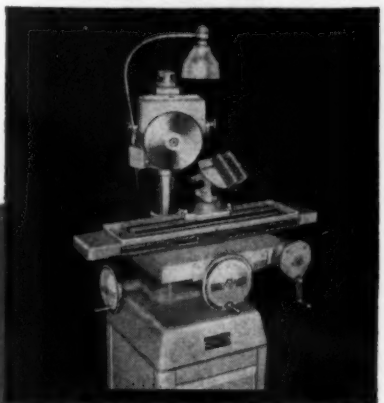
Get in touch with *Knock-Out* at Aberdeen or with your nearest K-O distributor.



SINGLE SPEED
UNIVERSAL TOOL GRINDER



UNIVERSAL
CARBIDE TOOL GRINDER



CHIP BREAKER GRINDER

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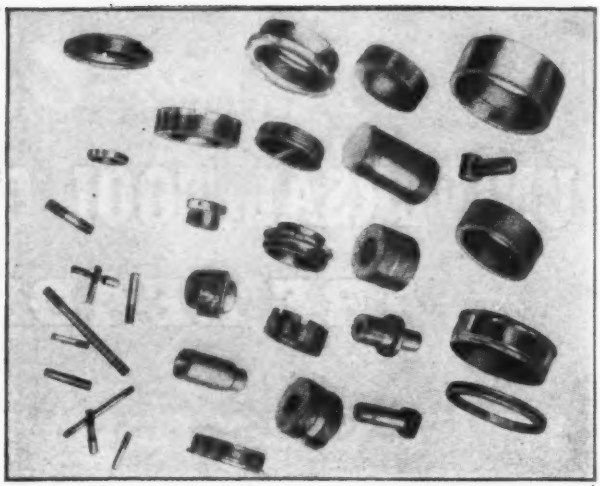
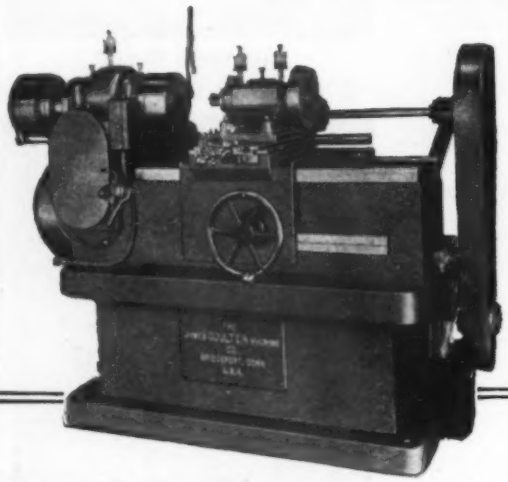
**K. O. LEE COMPANY--ABERDEEN, S. D.**

*Manufacturers of fine tools and equipment for over thirty years*

*. . . for Precision Internal or External Threads . . . Right or Left Hand*

## HANDLE PRODUCTION AUTOMATICALLY on the COULTER HOB THREAD MILLER





This modern machine can be depended on to produce and duplicate close tolerance threaded parts. With the exception of loading, all operations are fully automatic. Any parts that can be held in a Universal chuck, air-operated chuck or special fixture can be threaded, on the COULTER, internally or externally, either right or left hand.

Work can be inserted from either face or rear end, through large hole in work spindle, thereby making possible the threading of shaft ends, tubing or other long work.

Individual Motors on the COULTER for work and cutter spindles provide a wide range of speeds and feeds for handling such materials as brass, aluminum or steel.

*Illustrated literature covering full details of this machine is available promptly on request.*

THE JAMES **COULTER** MACHINE CO.
BRIDGEPORT, CONNECTICUT

---

## MOREY TURRET LATHES for BAR or CHUCKING { UNIVERSAL or PLAIN

### # 3 UNIVERSAL

For bar stock up to 1½" in diameter
10" turning length
16½" swing over bed
Infinite spindle speeds: 55 to 1800 RPM, constant speed motor, 1200 RPM
AVAILABLE ALSO WITH PLAIN CROSS SLIDE
Ask for Circular 727A

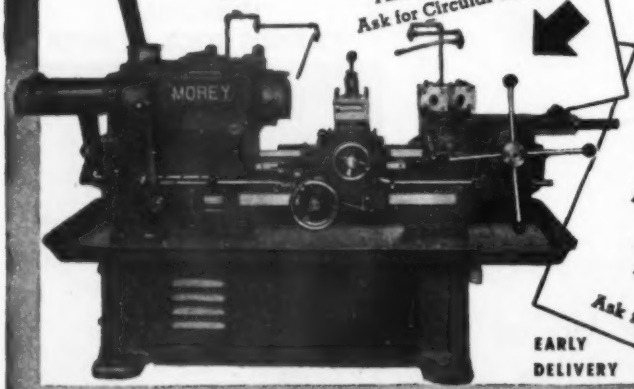
### # 2 PLAIN-GEARED

For bar stock up to 1" in diameter
Turning length 6½"
Swing over cross slide 6"
Swing over bed 14"
Infinite spindle speeds:
Minimum of 60 RPM.
Maximum of 2000 RPM.
Constant horsepower at all speeds.
Ask for Circular 629A

### # 4 UNIVERSAL

For bar stock up to 2" in diameter
12" turning length
18½" swing over bed
Infinite spindle speeds: 35 to 1500 RPM, constant speed motor, 1200 RPM
AVAILABLE ALSO WITH PLAIN CROSS SLIDE
Ask for Circular 736A

EARLY DELIVERY




- INFINITE SPINDLE SPEEDS —Electrically Selected—
- DIRECT BELT DRIVE AVAILABLE AT HIGH SPEEDS ELIMINATES GEAR MARKS (patents applied for).
- GEARED SPINDLE SPEEDS INSTANTLY AVAILABLE THROUGH MULTIPLE DISC CLUTCHES.
  SPINDLE MOUNTED ON TIMKEN BEARINGS.
- RIGID—WITH SUFFICIENT POWER TO TURN AT THE HIGHEST SPEEDS AND FEEDS *MODERN* TOOLS WILL WITHSTAND.
- SPINDLE SPEEDS AND POWER FEED CHANGES WITHIN EASY REACH OF OPERATOR.

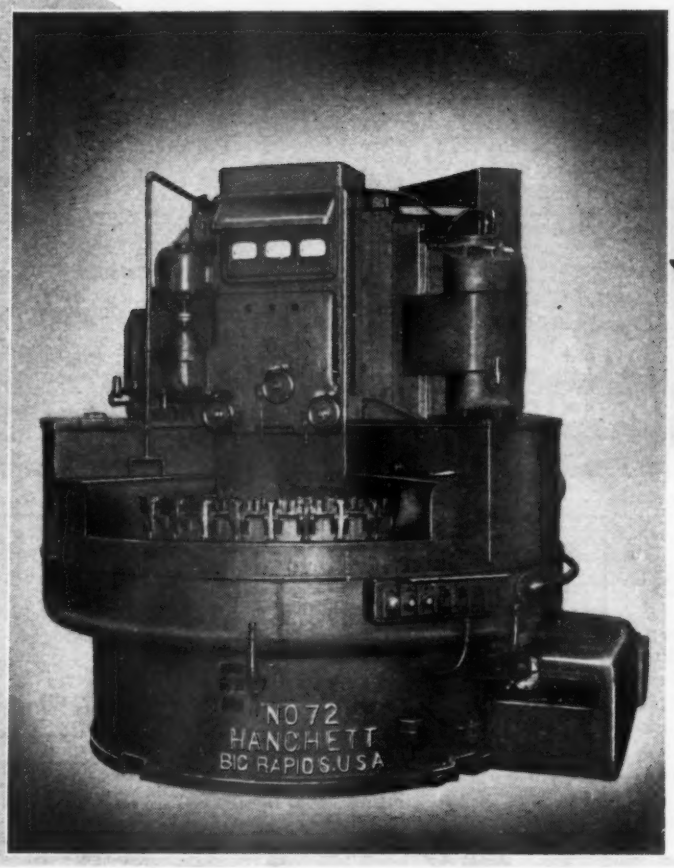
ARMY E NAVY

THE DESIGN OF THE MOREY No. 2, 3 and 4 TURRET LATHES ARE BASICALLY ALIKE. EACH MACHINE IS ENGINEERED FOR THE SIZE WORK IT IS DESIGNED TO HANDLE.

DESIGNED AND BUILT BY
**MOREY MACHINERY CO., INC**
410 BROOME STREET, NEW YORK 13, N. Y.
PLANT: 4-57 26TH AVE., ASTORIA 2, NEW YORK

# When 1 + 1 = 3 !

## 1 SET-UP ON 1 HANCHETT "72" CARRIES WORK THROUGH 3 GRINDING OPERATIONS . . .




**ROUGH . . SEMI-FINISH . . FINISH**

*All in One Pass*

An efficient, three-phase cycle that puts precision surface grinding on a really high-production level! Note the variety of work handled by the Hanchett 72 — see how your own production grinding can be simplified!

File Blanks. (Ground from rough, 900 complete blanks per hr.)

Connecting Rods. (.010 to .015 stock removal 900 per hour — .00075 for parallel.)

Electric iron sole plates. (1,000 per hr., 1/8" stock removal.)

Cylinder Heads. (Removing .150" flat and to size within .001, 120 per hr.)

Mower Blades. (Removing .020 — accuracy and uniformity maintained — 4800 to 6000 per hr.)



Clutch Housings. (Ground flat and parallel, 200 per hr.)

The Hanchett 72 is a truly high production surface grinder. Three vertical grinding spindles remove rough stock, smooth off the surface and give the work a finish to precision tolerances — in the time an ordinary grinder would use for only one of these operations! Work sizers mounted after each wheel automatically check depth of cut and compensate for wheel wear. Ammeters on each spindle keep operator informed of grinding efficiency and a light signals when wheels are worn. Push-button control station co-ordinates all operator movements — the problem of human error is practically eliminated when you turn over Production Surface Grinding to a Hanchett 72!

Get complete information about the Hanchett 72. Write today for Bulletin 141AJ.

HANCHETT HERMETI-COIL MAGNETIC CHUCKS

HANCHETT GRINDERS BIG RAPIDS MICHIGAN

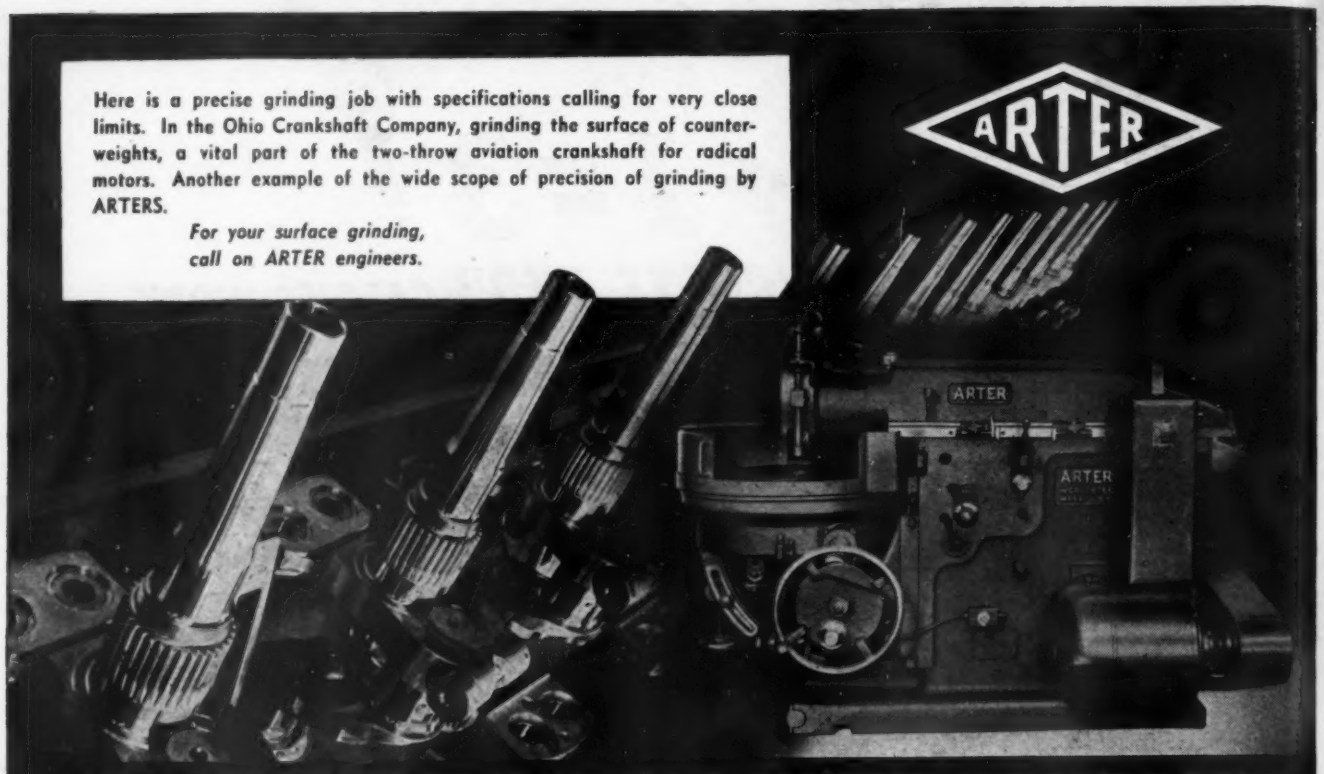
IF IT'S A FLAT SURFACE—THERE'S A HANCHETT TO GRIND IT

**HANCHETT MANUFACTURING CO.**

BIG RAPIDS, MICHIGAN U.S.A.

Here is a precise grinding job with specifications calling for very close limits. In the Ohio Crankshaft Company, grinding the surface of counterweights, a vital part of the two-throw aviation crankshaft for radical motors. Another example of the wide scope of precision of grinding by ARTERS.

*For your surface grinding, call on ARTER engineers.*




**ARTER GRINDING MACHINE COMPANY**

ARMY E NAVY

**WORCESTER, MASSACHUSETTS • U. S. A.**

**Vertical ROTO-MATICS**

Multiple spindle drill heads and automatic clamping provide added production.

Continuous operation is essential for maximum production. VERTICAL ROTO-MATICS are continuous operating, multiple spindle, non-indexing machines that are adaptable to a wide range of machine problems. . . . *Bulletins 110 and 120* may help you solve your problems. Write for them.

**Davis and Thompson Co.**

Mfrs. of Machine Tools and Micrometers

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**SMITH & MILLS**

**CRANK SHAPERS**

sizes 12" to 32" stroke

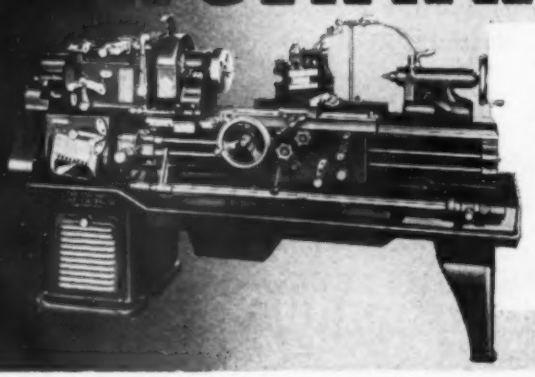
**THE SMITH & MILLS CO. Cincinnati, Ohio**

For cutting internal keyways, slots or splines 1/16" to 4" wide and up to 60" long. Fast—Accurate—Flexible. Write for particulars and catalog on machine for your work.

**Giant KEYSEATERS**

*MITTS & MERRILL*
913 Tilden St.
Saginaw, Michigan

**CINCINNATI LA**



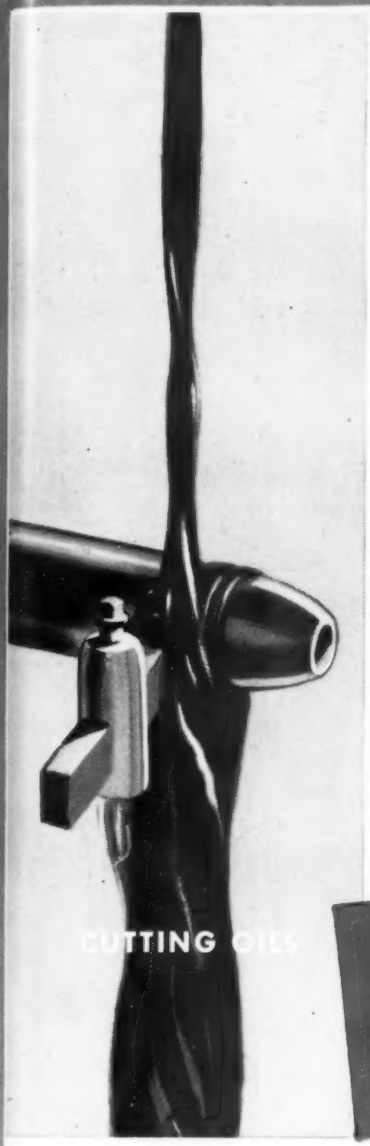
**CINCINNATI LATHES—*A Proved Way to Low Piece Cost***

CINCINNATI engineers have a long background of experience in the design and manufacture of lathes and have applied it in the modern machines which are speeding production and cutting costs in shops all over the metal working industry. The *proved* performance of CINCINNATI LATHES is your assurance of their real value. Sizes: 14" to 30". *Full information on request.*

**THE CINCINNATI LATHE & TOOL CO.**

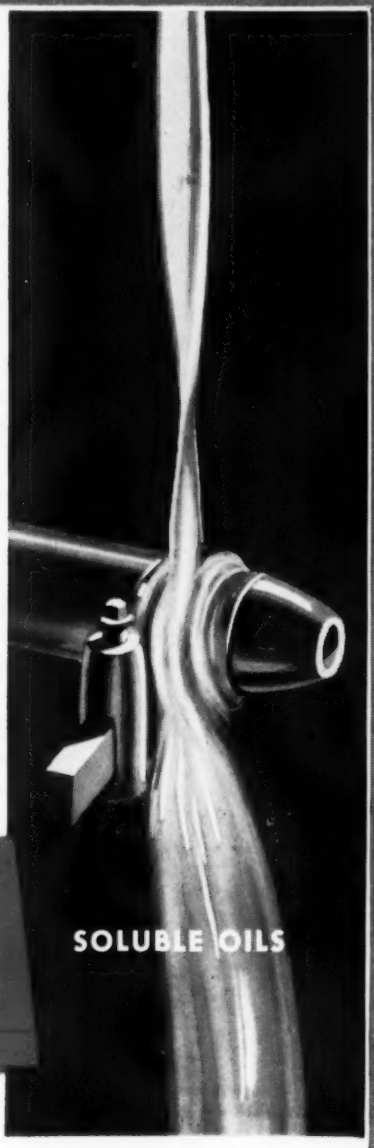
Rogers Road, Oakley SPECIALISTS SINCE 1906 Cincinnati, Ohio

LUBRICATION ENGINEERING . . . LUBRICATION ENGINEERING . . . LUBRICATION ENGINEERING . . .




# Fills the gap between cutting oils and soluble oils

STANICOOL HD




• DO YOU find that on certain machining operations neither cutting oils nor soluble oils do a satisfactory job? Do you find that cutting oils lack the cooling quality needed and that soluble oil gives short tool life or poor finish?

There's where Stanicool HD may help you. It is used in a water-and-oil emulsion; therefore it gives effective cooling. But it is especially fortified to reduce welding between tool and work—to give longer tool life and better finish than conventional soluble oil. It has speeded up many wartime jobs.

A Standard Cutting Oil Specialist will be glad to consult with you on your cutting oil problems. Stanicool HD or some of our other new war-developed products may be just what you need to help reduce production cost on your post-war products. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for the Cutting Oil Specialist near you.

*Buy and hold more Victory Bonds*

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STANDARD OIL COMPANY (INDIANA)

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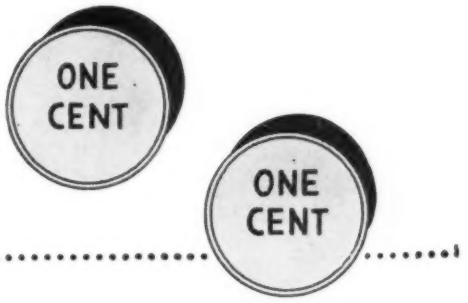
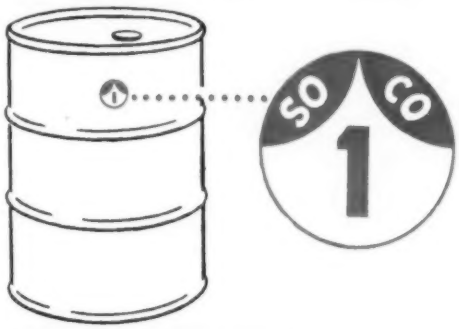
# It's as easy as matching pennies



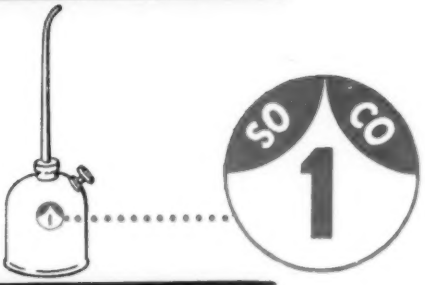

## to get the right lubricant in the right places with Standard's

## CODED LUBRICATION

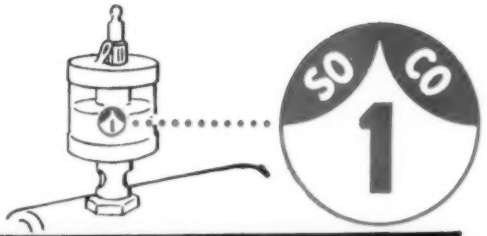
From storage container . . .




to oil can . . .




to oil cup . . .




by matching the numbers

• WITH Standard's Coded Lubrication, lubricants are handled from the drums or storage containers to oil cans or grease guns to the oil cups or grease fittings on equipment—by simple code numbers to identify them. It's easy to see how this eliminates the confusion of brand names and grades which your oiler must know—how it reduces the possibility of errors and the misapplication of lubricants which may result in damaged equipment or in applying expensive lubricants where they are not needed.

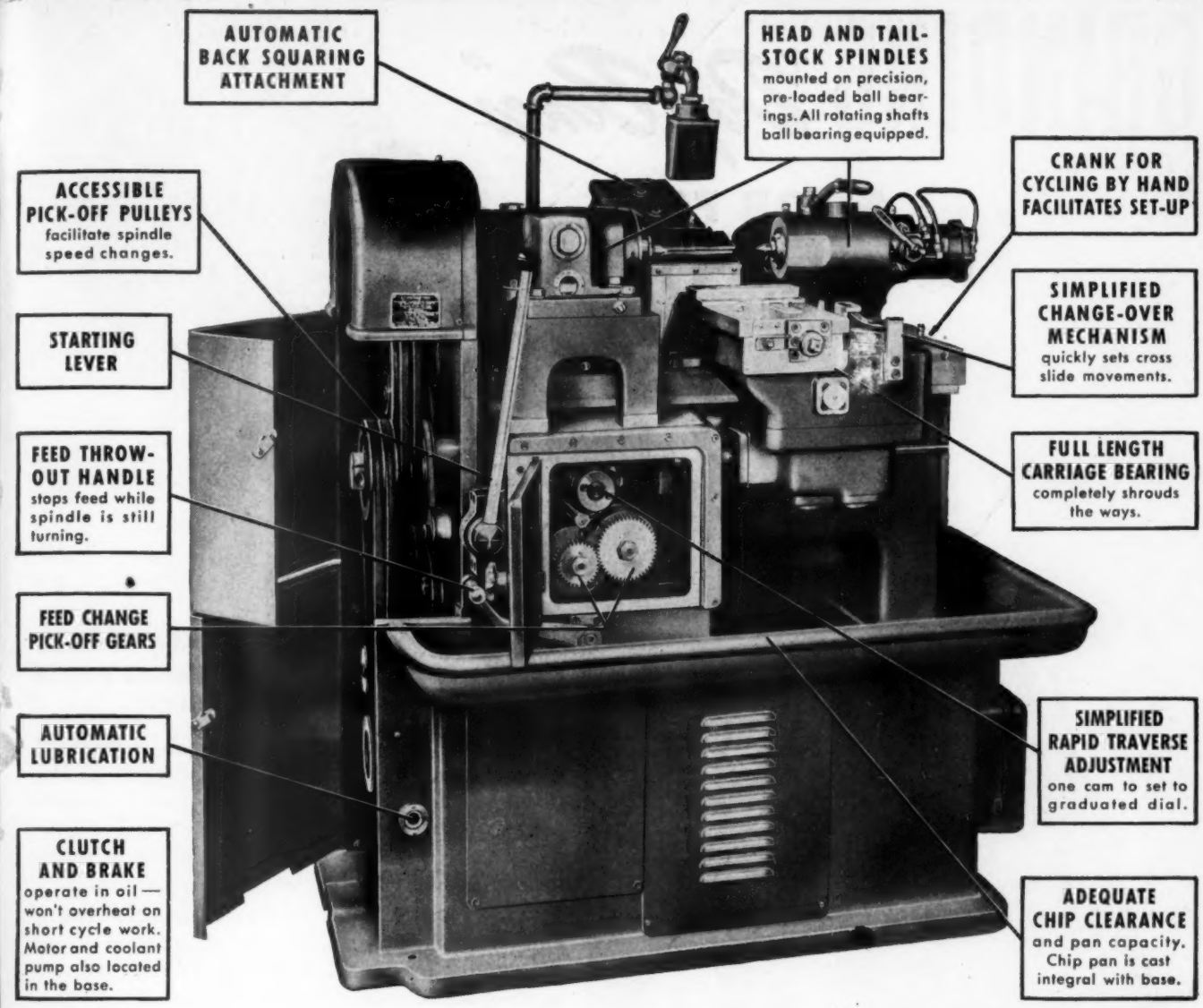
To install this system, you assign numbers to the lubricants used in your plant. Standard Oil will supply the numbered decals to be applied to the containers and lubricating spots. Now, when reconversion is in full swing, is a good time to plan on better, cost-saving lubrication.

A Standard Oil Lubrication Engineer will be glad to give you further information or consult with your lubricating men in the application of Coded Lubrication in your plant. This offer is available to all plants in the Middle West. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

*Buy and hold more Victory Bonds*

**STANDARD OIL COMPANY (INDIANA)**

STANDARD SERVICE


AUTOMATIC BACK SQUARING ATTACHMENT
HEAD AND TAIL-STOCK SPINDLES mounted on precision, pre-loaded ball bearings. All rotating shafts ball bearing equipped.
CRANK FOR CYCLING BY HAND FACILITATES SET-UP
ACCESSIBLE PICK-OFF PULLEYS facilitate spindle speed changes.
SIMPLIFIED CHANGE-OVER MECHANISM quickly sets cross slide movements.
STARTING LEVER
FEED THROW-OUT HANDLE stops feed while spindle is still turning.
FULL LENGTH CARRIAGE BEARING completely shrouds the ways.
FEED CHANGE PICK-OFF GEARS
SIMPLIFIED RAPID TRAVERSE ADJUSTMENT one cam to set to graduated dial.
AUTOMATIC LUBRICATION
CLUTCH AND BRAKE operate in oil — won't overheat on short cycle work. Motor and coolant pump also located in the base.
ADEQUATE CHIP CLEARANCE and pan capacity. Chip pan is cast integral with base.

# *Lo-swing* IMP...

### *A Small, Fully-Automatic Lathe with Unlimited Tooling Possibilities*

● Designed primarily for work demanding high speeds and extreme accuracy, the IMP's sturdy, compact design makes it equally suitable for turning heavier work such as small pistons, bushings, gear blanks, etc.

Noteworthy IMP features are graphically presented in the above illustration. Note the compactness and accessibility of the parts which require a change in setting when changing over from one job to another. Aside from a change in tool blocks, there are only four adjustments to make: *first*, change of spindle speeds (when required) thru pick-off pulleys; *second*, change of feed pick-off gears (when required); *third*, setting of one *graduated sector* in carriage to control movements of the front carriage cross slide; *fourth*, setting of one rapid traverse cam to *graduated dimensions* on the dial.

Another important IMP feature is the extremely long carriage bearing on the ways, obtained thru a unique head and tailstock design which permits the carriage slides to pass under them. Since the carriage is mounted on a flat and "V" way exceptionally fine finishes are possible with light cuts using carbide and diamond point tools.

The spindle is mounted on selected precision ball bearings, and speeds up to 5000 RPM may be maintained. The machine cycle is started by a hand lever which may also be used for emergency stops at any point within the cycle and, of course, the machine stops automatically at the end of its cycle. All shafts are mounted on anti-friction bearings and the main parts, including the carriage ways, are automatically lubricated.

The *Lo-swing* IMP lends itself to practically unlimited tooling possibilities. A Third Slide or Overarm for additional facing or chamfering operations can be furnished as well as a number of other special attachments. Send us your prints or write for complete information about this versatile lathe.

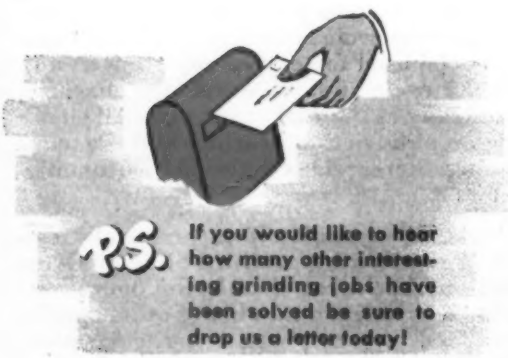
## SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

# GRINDING "Dog Bones" . . . A JOB FOR INGENUITY!

**UNIQUE FIXTURE PLUS DUMORE NO. 5 GRINDS SPHERICAL PARTS TO CLOSE TOLERANCES!**

The ball ends of these tiny connecting rods (1⅛" long) had to be finished to .0002" tolerance on the diameter and with no greater deviation from perfect sphericity. The unique and highly practical solution to this production grinding problem was a special machine which included the combination of a Dumore No. 5 Grinder and an unusual mounting fixture. The grinding wheel moves in an arc across the rotating part which is held in a live spindle by an air operated collet. The movement necessary plus the close tolerances required is stark testimony to the amazing precision of both the machine and the Dumore Grinder.

Again the practical value of the Dumore Grinder as a precision production tool has been conclusively proved. Three complete units were built to run this job. They operated 16 hours a day with precision maintained constantly. If you want to expand your grinding facilities — and at low cost — investigate Dumore Precision Grinders and their vast application possibilities now! The Dumore Company, Tool Division, Dept. TE28, Racine, Wisconsin.



P.S. If you would like to hear how many other interesting grinding jobs have been solved be sure to drop us a letter today!

**Sold by Authorized Industrial Distributors in all Principal Cities**

**DUMORE**

**PRECISION AND HAND GRINDERS**

WHATEVER YOUR PRODUCT MAY BE
GIVE IT QUALITY CONTROL
with VARD
GAGE ENGINEERING
SERVICE
Let's not forget the fact that Quality Control was the Key to American War Production. It was uniform adherence to high standards and interchangeability that turned out the flood of top notch weapons by which the Allies won the war. Now—if you are going to win your own battle of peacetime production—hang on to the key of our wartime success. Make the products of your plant meet the standards imposed by accurate gages. See to it also that all the components you buy from sub-contractors are gaged to the same accuracy. Then you can be sure that all parts match together into a perfect job.
VARD INC. is one of the country's leading makers of precision gages for machined work. We offer you the advantage of our extensive wartime experience in your reconversion and new product programs. We will gladly assist you, at most reasonable rates, in the engineering and planning of your Quality Control. Brains are the cheapest commodity you can buy. We have Gage Engineering brains For Sale. Call us today and ask about it.
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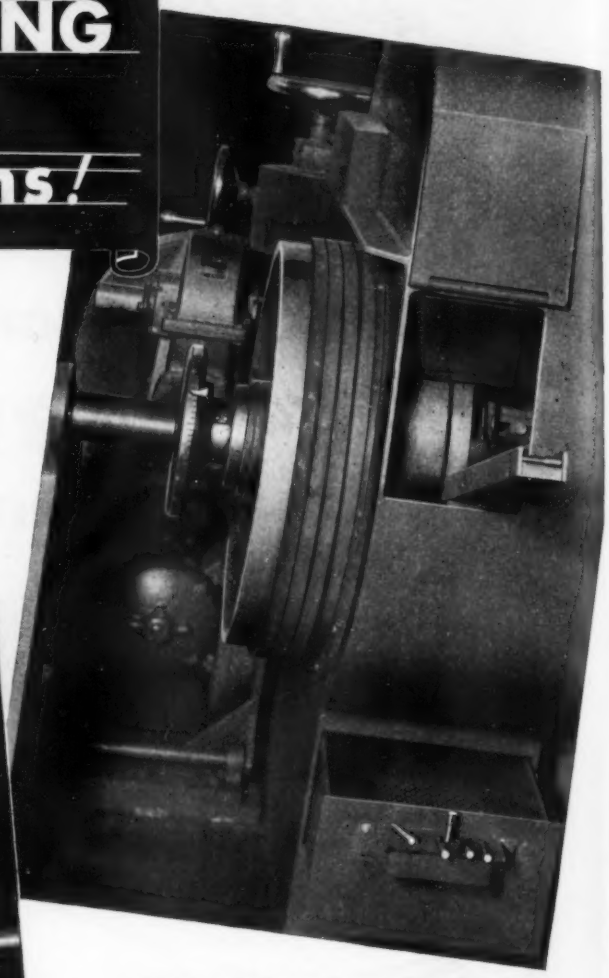
ARMY
E
NAVY

# Give a Thought To GARDNER-GRINDING In Your *Modernization* Plans!

*This example of flat-surfacing efficiency is being duplicated on* GARDNER-GRINDERS *in all parts of the country.*



— it's a logical way to cut your flat-surfacing costs.

Plan now to get the jump on competition by utilizing its high-production and extreme-precision possibilities. Here's one example of what it is doing in the aircraft industry — grinding one end of steel studs on a semi-automatic GARDNER No. 223-23" GRINDER.

**THE PRODUCTION STORY:**

STEEL STUDS, 1/4" to 7/16" dia. x 1" to 3½" long. Ground on a No. 223-23" GARDNER GRINDER, with notched-type rotary work carrier. Studs loaded by hand into inclined chute feeder — unloaded by gravity.

PRODUCTION: 60 to 80 pieces per minute, removing .010" maximum stock.

TOLERANCES: .004" for uniformity.

Write today for data on how GARDNER-GRINDING will improve the strategy of your *modernization* plans!

ARMY E NAVY

**GARDNER MACHINE COMPANY**

410 East Gardner Street • • • • Beloit, Wisconsin, U.S.A.

# Savings—Improvements—

Through Rubber-Cushioned

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**BURRING • FINISHING • POLISHING**

**"MUSTS" IN YOUR NEW-PRODUCT PROGRAM!**

**Brightboy STANDARD**
A favorite for burring, finishing and polishing on the widest variety of metals and metal parts.

**Brightboy FINE-TEX**
Smoother, finer texture for work on softer metals, producing special finishes and for applications where the coarser wheel might not be suitable.

**Brightboy TUFF-TEX**
Tougher texture, for finishing hard metals. The tougher binder accents the abrasive action, yet retains the soft rubber cushion, finishing and pre-polishing in one operation.

INVESTIGATE the outstanding time saving, product improvement methods offered by Brightboy, pioneer in rubber-cushioned abrasive wheels, blocks, sticks, rods. Made in 3 textures, for wide range of close-tolerance manual and machine applications.

RUBBER AND ABRASIVE WORK SIMULTANEOUSLY, eliminating production steps between the grind and the buff; cleaning, finishing, polishing in a single operation which often serves as the "final".

ASK A BRIGHTBOY SERVICE MAN to suggest production short cuts; ask your dealer for prices, catalog, work data.

**BRIGHTBOY INDUSTRIAL DIVISION**
**Weldon Roberts Rubber Co.**
**Newark 7, N. J.**

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Brightboy
REG. U.S. PAT. OFF.

...the standard of accuracy
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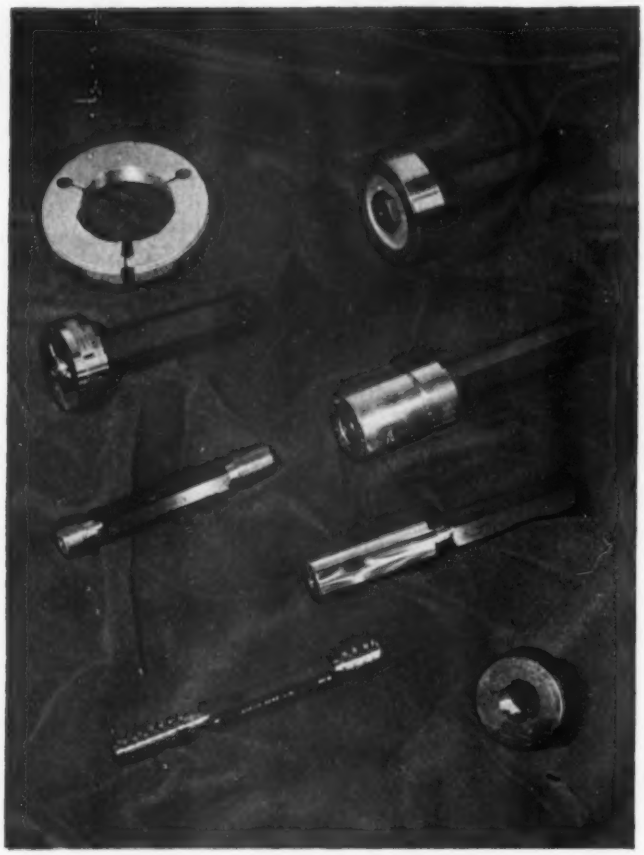


★ SCHRILLO RING AND PLUG GAGES bear the unmistakable stamp of character—in quality, precision and technical excellence. For example:

The Schrillo *Aging Process* completely relieves internal strains and prevents *gage growth*, thereby providing positive *size stability* and constant thermal expansion.

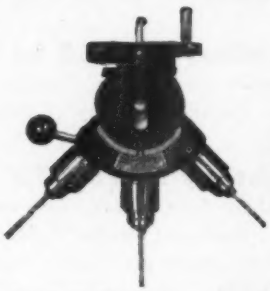
Meticulous inspection under laboratory conditions in air-conditioned, temperature-controlled testing rooms make *size control* a practical reality.

Tools of character bear the winged S that means *Schrillo*.

SCHRILLO
LOS ANGELES CALIFORNIA

NO STOPPING
FOR DRILL or REAMER CHANGES
Continuous Production With
UNIVERSAL'S
DRILL PRESS TURRET HEAD

Complete New Design



100% Rigid and Accurate

Models to fit all Drill Presses. Attached and removed quickly. Three spindle operations on one spindle Drill Press. See your Dealer—write or wire today for specifications and prices.

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TIME SAVER
FOR QUICK CHANGE MARKING
- Fastest, simplest way to number parts.
- Easy—turn screw to change numbers.
- Made of best quality tool steel.
- Guaranteed for years of service.
- PROMPT DELIVERIES

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# *Do it with* DALZEN

Left: Dalzen taps, in U. S., Metric, Whitworth, and Special forms are precision ground of hardened high speed steel in a complete size range. TUNGSTEN CARBIDE TAPS — EITHER SOLID OR INSERT — A SPECIALTY.

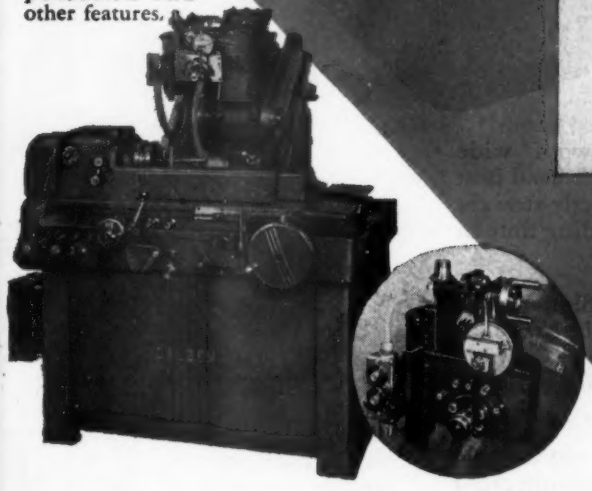
Left: High speed ground thread milling cutters, scientifically heat treated for longer cutting life

Dalzen manufactures an extensive line of precision cutting tools, parts, thread grinding and special machines — engineered for maximum efficiency and economical operation. Each is the result of years of experience on the part of designers and craftsmen. These are reasons why, all over the United States and in many foreign countries, master mechanics who have used and worked with Dalzen-made machines and tools say, "You can do it better with Dalzen." Write for details on how Dalzen can "do it better" for you.

Below: Dalzen "2-in-1" combines a dependable, accurate center lapping machine with a sturdy drill press. Saves on equipment costs, floor space.

Below: No. 5 *Electronic* Thread Grinder. Easy to operate. High production efficiency and accuracy by controlled wheel speed, motor driven dresser, automatic compensation and other features.

Right: No. 2 Thread Grinder. Compact, upright design saves floor space. Simple to operate. Low first and maintenance cost. Ideal for short or production runs.



Right: Threaded parts are ground to close tolerances exactly to your specifications. Rigid inspection standards assure a uniform fine finish. Jobs requiring rolled or cut threads are also handled.

# DALZEN

## TOOL AND MANUFACTURING CO.

**12255 EAST EIGHT MILE ROAD • DETROIT 5, MICH.**

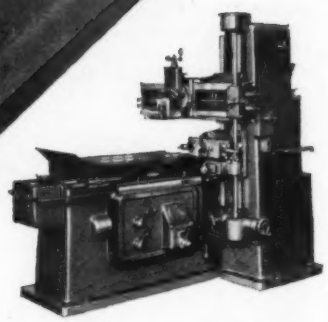
# MATTISON GRINDER Holds Close Limits On 3000-Pound Base Casting 34″ High

The rugged double-column design of the Mattison Grinder certainly pays off on the job shown above. This 3000-pound iron casting, 34″ high, has two 4″ wide flat ways 74″ long. In grinding these ways the Mattison wheel-head is at the very top of its adjustment yet the surfaces ground are perfectly straight and flat within very close limits. Finish is excellent, so is grinding time of 50 minutes, floor to floor.

Other parts for Rockford Hy-Draulic Shapers, Planers, Slotters and Shaper-Planers that come to this Mattison Grinder include Tables, Saddles, Side Rails, Cross Rails, Slotter Ram Guides and Gibs in many sizes. These use the full capacity of the grinder in all directions with uniformly high production and precision on every operation.

Rugged, high powered and versatile, Mattison Grinders are capable of handling your grinding jobs on a real production basis, providing close accuracy and a fine finish.

For further information on various types of jobs ground on the Mattison Grinder, send for a copy of the latest, free, set-up book.



The Mattison grinder job illustrated is a base casting for the 36″ Openside Rockford Hy-Draulic Shaper shown above.

## ADDITIONAL INFORMATION

Also available is free Set-Up Book showing further examples of work ground on Mattison Grinders — Send for a copy today.

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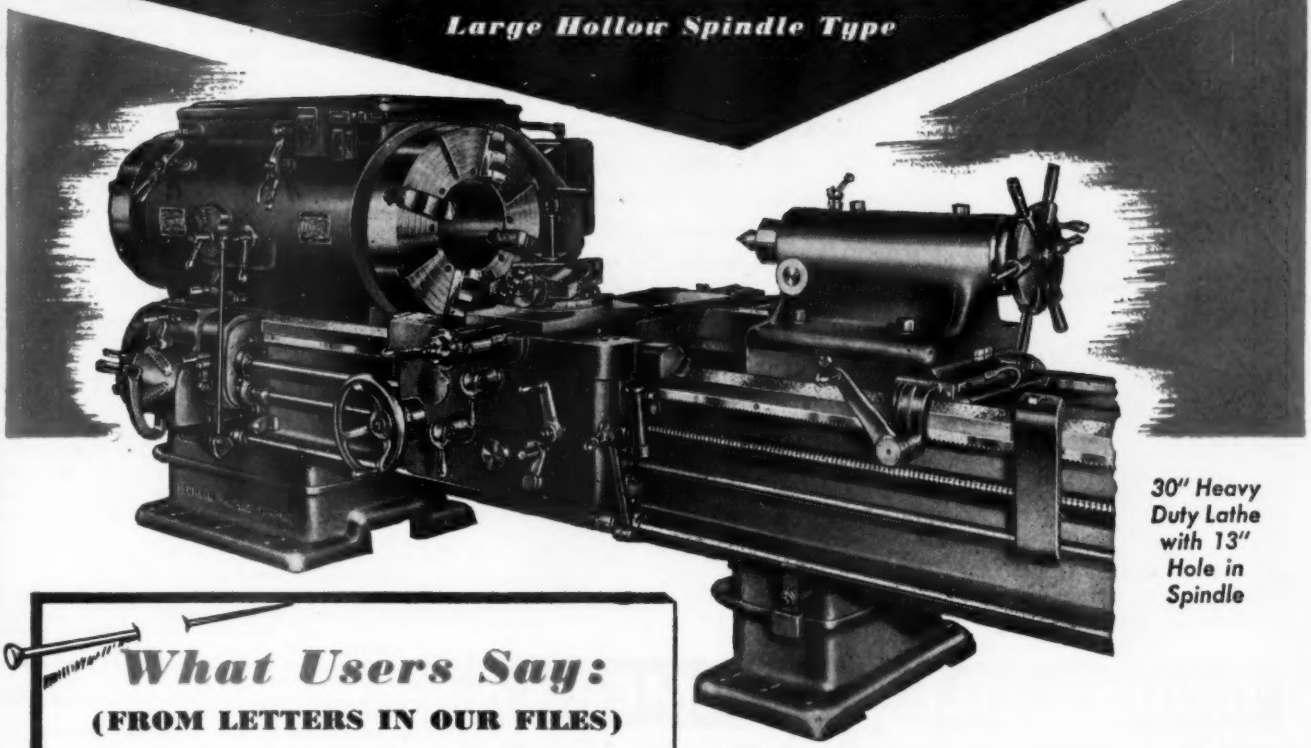

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**Large . . . . . 27" up to 13" Hole**
**Large . . . . . 30" up to 14" Hole**
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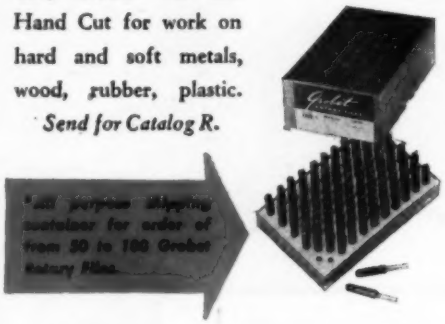


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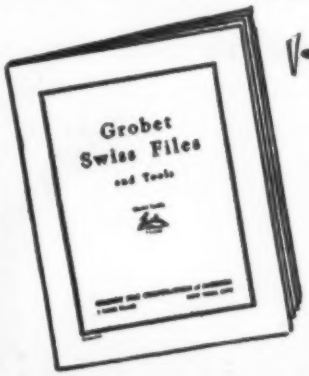
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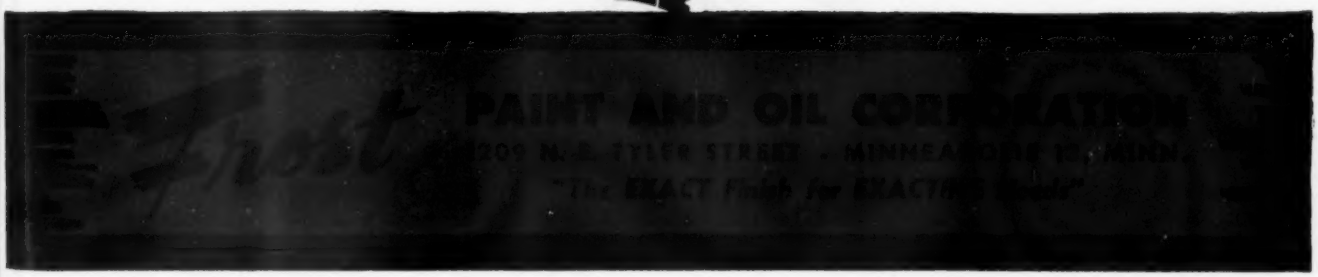
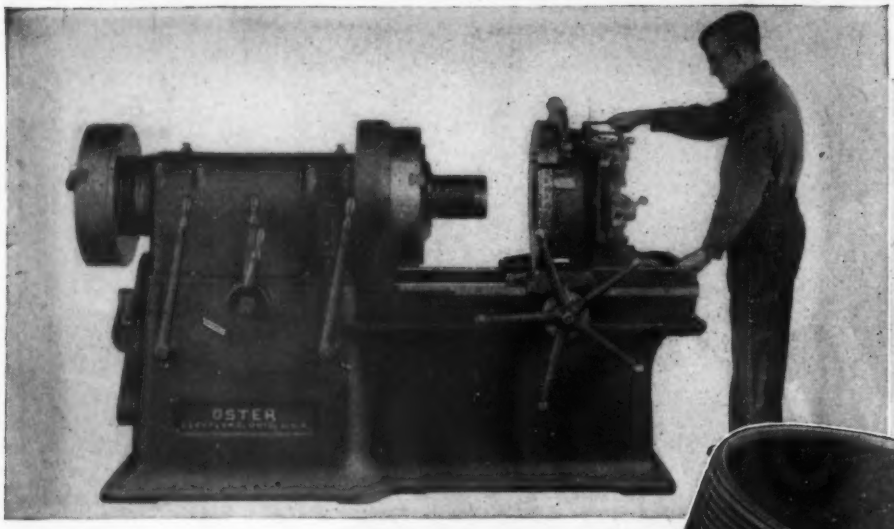
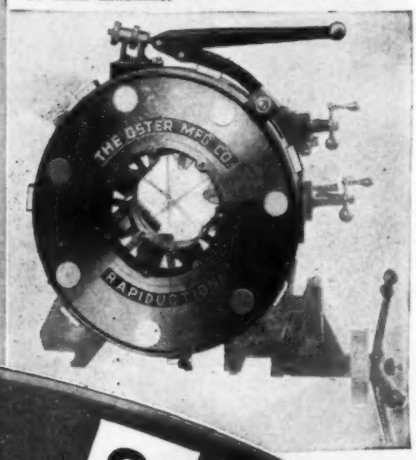





Oster "RAPIDUCTION" die-head adjusted to thread largest size of pipe within range of each machine.

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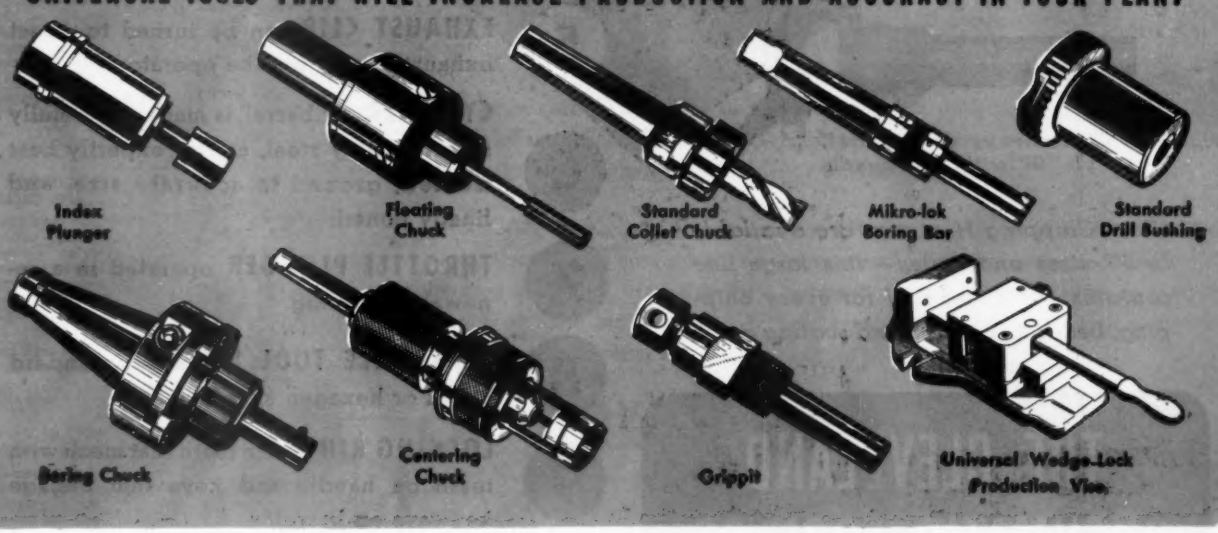


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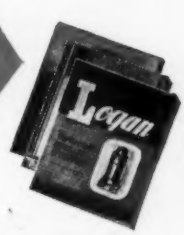


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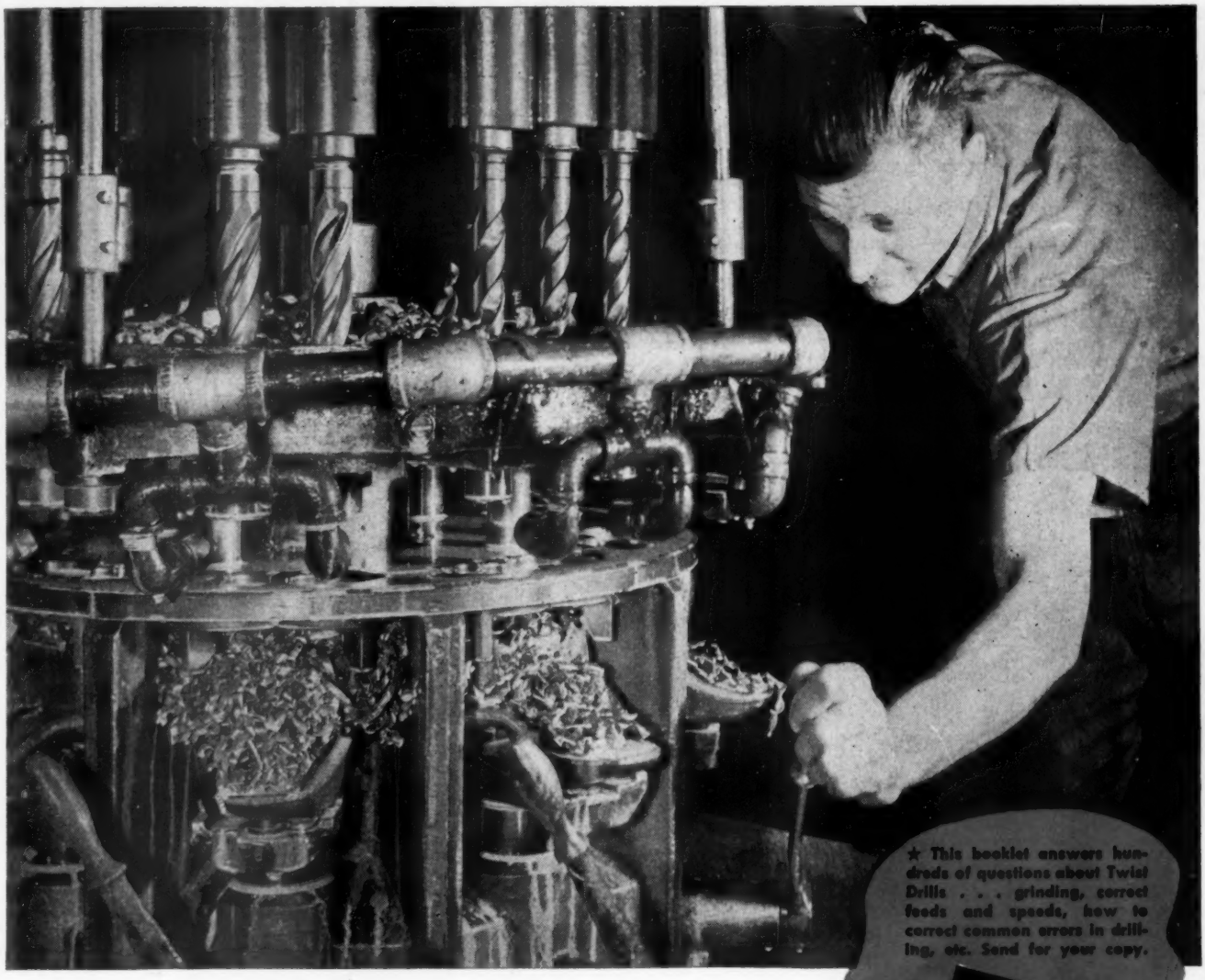

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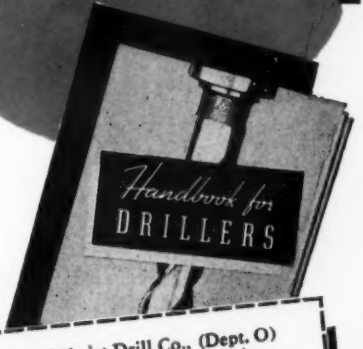


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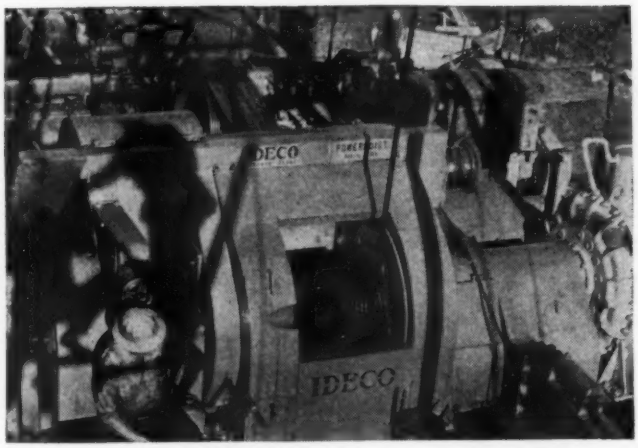


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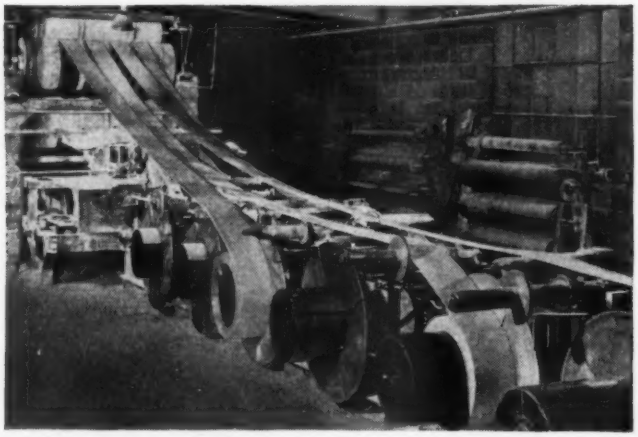

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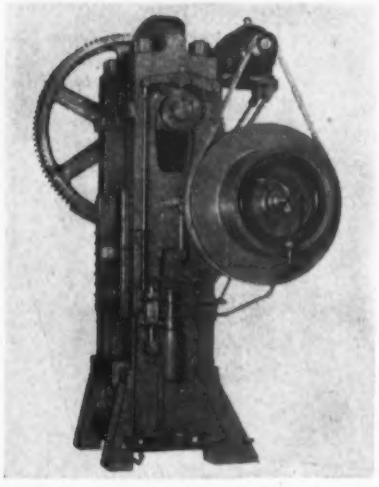

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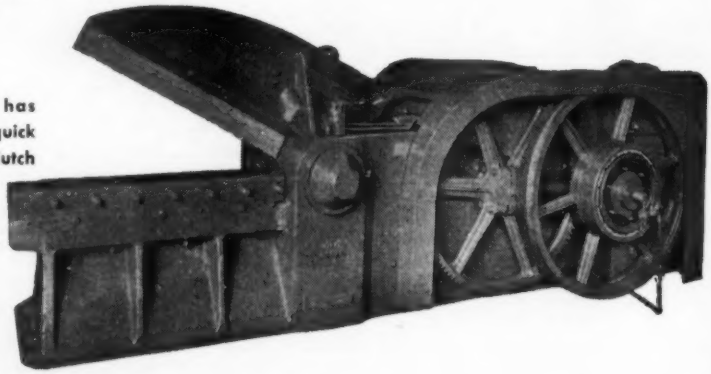
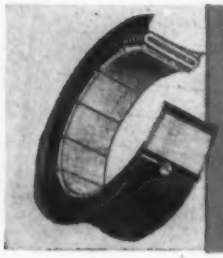


▶ Alligator shear operates through Fawick Clutch and Brake.



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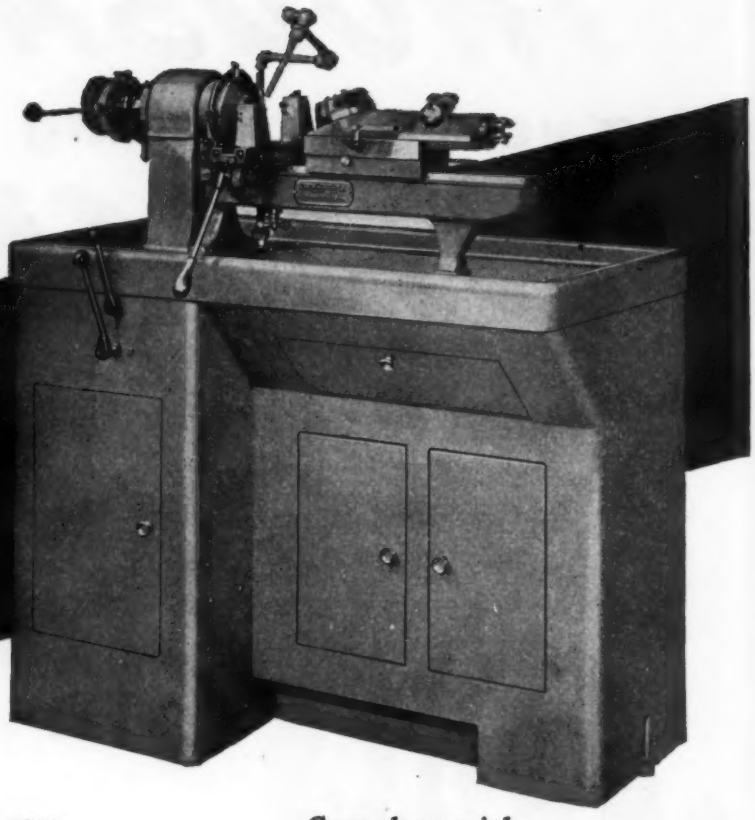

You reduce your production costs, and save time and money, when you use the Wade Precision Hand Screw Machine for your second operation machine work. This precision machine gives you more units per man hour production because of the many modern advantages in its design.

The enclosed drive gives instantaneous spindle speeds over the complete high-speed range necessary for second operation; spindle bearings are designed to give chatter-free operation and better finished cuts. Spindle speeds are conveniently controlled in ratio of 4 to 1 for efficient tapping, reaming and dieing operations. A self-indexing, automatic clamping turret assures perfect alignment for most exacting work and a scale mounted on the turret head saves time in setting up. The machine requires no additional power service.

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Magnesium
Manganese Steel
Malleable Cast Iron
Nickel Chromium
Nickel Steel
Silicon Manganese
Silver
Stainless Steels
Tungsten Steel
Zinc

## PLASTICS

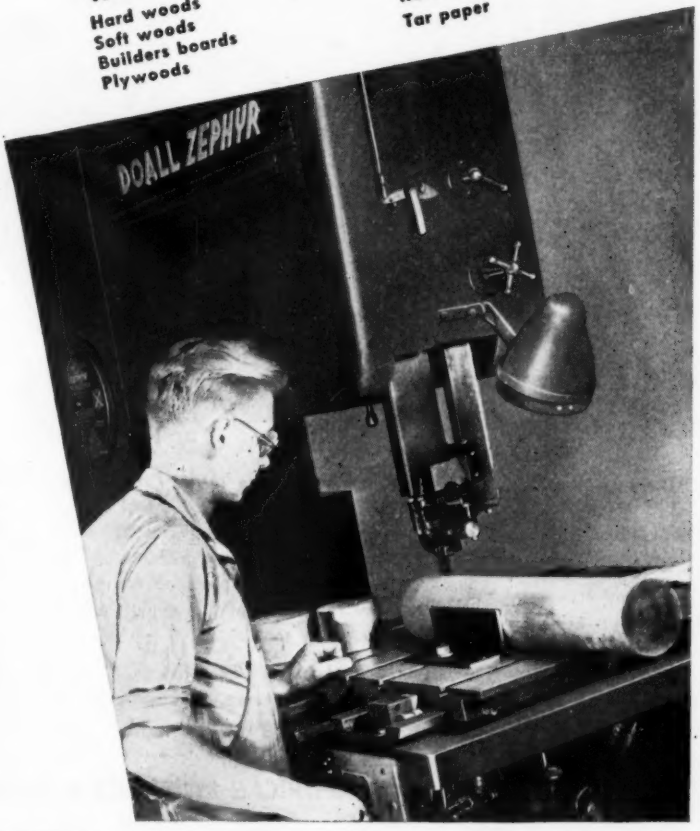
Methyl Metacrylates
Cellulose Acetate and Butyrate
Phenolic, Cast
Phenolic, Laminates
Phenolic Moulding
Polystyrene
Urea
Vinyl Resin

## WOODS

Hard woods
Soft woods
Builders boards
Plywoods

## MISCELLANEOUS

Aluminum foil
Asbestos
Brake Lining
Bone
Carbon
Insulating wool
Leather
Mica
Paper
Refractory brick
Rubber
Tar paper

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## THE GREEN LIGHT

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**NEW** MEDIUM PRICED HIGH QUALITY 16" ZEPHYR

*Write or Phone for Demonstration*

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Contour Sawing | Band Filer | Surface Grinders | Magnetic Chucks and Selectron | Colloidal Oils | Dust Collector | Band Saws | Band Files | Gage Blocks with Instruments

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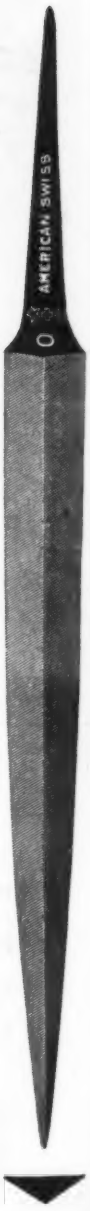
*Telephone Your "DoALL" Sales and Service Store*

# WHO USES THEM




Who uses "American Swiss" Swiss Pattern Files? Nearly every metal craftsman . . . tool and die makers, silversmiths, watchmakers, model makers, finishers in every industry from builders of giant turbines to makers of the precision instruments which control the flight of our mighty aircraft use these precision tools.

Craftsmen who know the importance of quality in tools look for the name *American Swiss* on the files they buy because they know from years of experience that these files are uniform in hardness . . . fast cutting . . . smooth finishing . . . and economical. Craftsmen know, too, that there are over 3,000 *American Swiss* styles, cuts and sizes from which to choose. That's important because using the correct file for the job speeds the work and produces a better job.

Keep your filing costs to a minimum by having your shop properly equipped with *American Swiss* Swiss Pattern Files. Leading distributors everywhere carry a full stock.

**AMERICAN SWISS FILE & TOOL CO., ELIZABETH 1, N. J.**

ASK FOR THEM BY NAME

*American Swiss* ONLY THE BEST

## SWISS PATTERN FILES

# GET THE MOST FROM YOUR

# END MILLS

**Elimination of end play in the spindle is particularly important when using end mills. Rake on end teeth tends to pull cutter out of the spindle, letting it hog into the work if not securely held. End mills having shanks of equal or larger diameter than the cutter are recommended.**

**For maximum production with minimum wear and tear on tools, specify National end mills of proper design for each job.**

*Call Your* **DISTRIBUTOR!**

Leading distributors in every section of the country have stocks of National Cutting Tools. Every National distributor offers factory trained engineers to serve you. Call your National distributor for cutting tools or any staple industrial product.

# NATIONAL

NATIONAL TWIST DRILL & TOOL — ROCHESTER, MICH., U.S.A.

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# NOW

## Jacobs PRODUCTION CHUCKS

The radically new design of Jacobs Production Chucks with the Rubber-Flex Collet brings greater efficiency and economy to modern manufacturing. Developed for multiple spindle machines, they present a special advantage on heavy duty production drilling and reaming operations.

These accurate, small diameter chucks have three distinct features: 1 — Ability to handle an unusually wide range of drill sizes. 2 — Extreme simplicity which features the Rubber-Flex Collet of one-piece construction ground as a unit after molding. 3 — Parallel jaw gripping surfaces that provide tremendous grip.

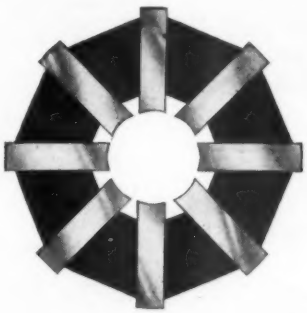
The Chuck socket receives the flatted tang of the drill and will take all drills having the same flat size. *However, on most applications,* because of the tremendous grip of the Rubber-Flex Collet, *standard drills can be used without danger of slippage.*

# A NOTABLE ADVANCE IN CHUCK DESIGN!

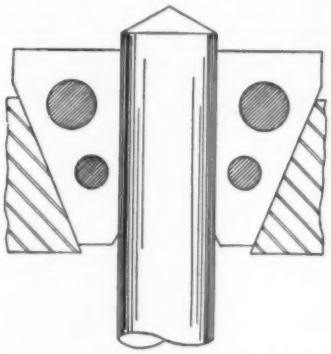
**Only 12 Jacobs Production Chucks and 3 Detachable Arbors Cover More Than 300 Single Purpose Chuck Applications!**

## WITH THE RUBBER-FLEX COLLET

## "THE COLLET WITH A RANGE"



At maximum capacity – Neoprene at rest.



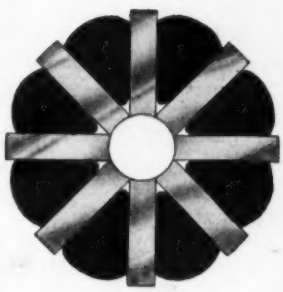
On larger shanks, jawbites are always parallel and have full length bearing.

Rubber-Flex Collets are entirely different – in design and operation – from any collet now in use. And, because each has a range of capacities, tool inventory costs can be drastically reduced.

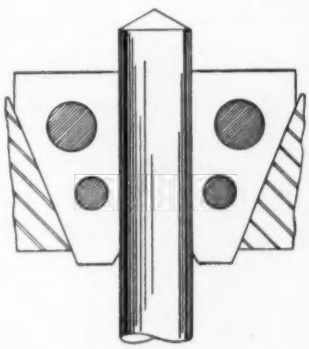
The Rubber-Flex Collet has individual hardened alloy steel jaws, uniformly spaced, and molded into an integral unit with a special compound of oil-resisting Neoprene. All flexing is taken care of by the Neoprene which is bonded to, and passes through, holes in the jaws.

*The jaws of the collet grip their full length and are always parallel throughout their entire range.* Having no delicate parts, the Rubber-Flex Collet will withstand unusual abuse without loss of accuracy or gripping power!

Write for special Bulletin P-1 today. The Jacobs Manufacturing Company, Hartford 2, Connecticut.

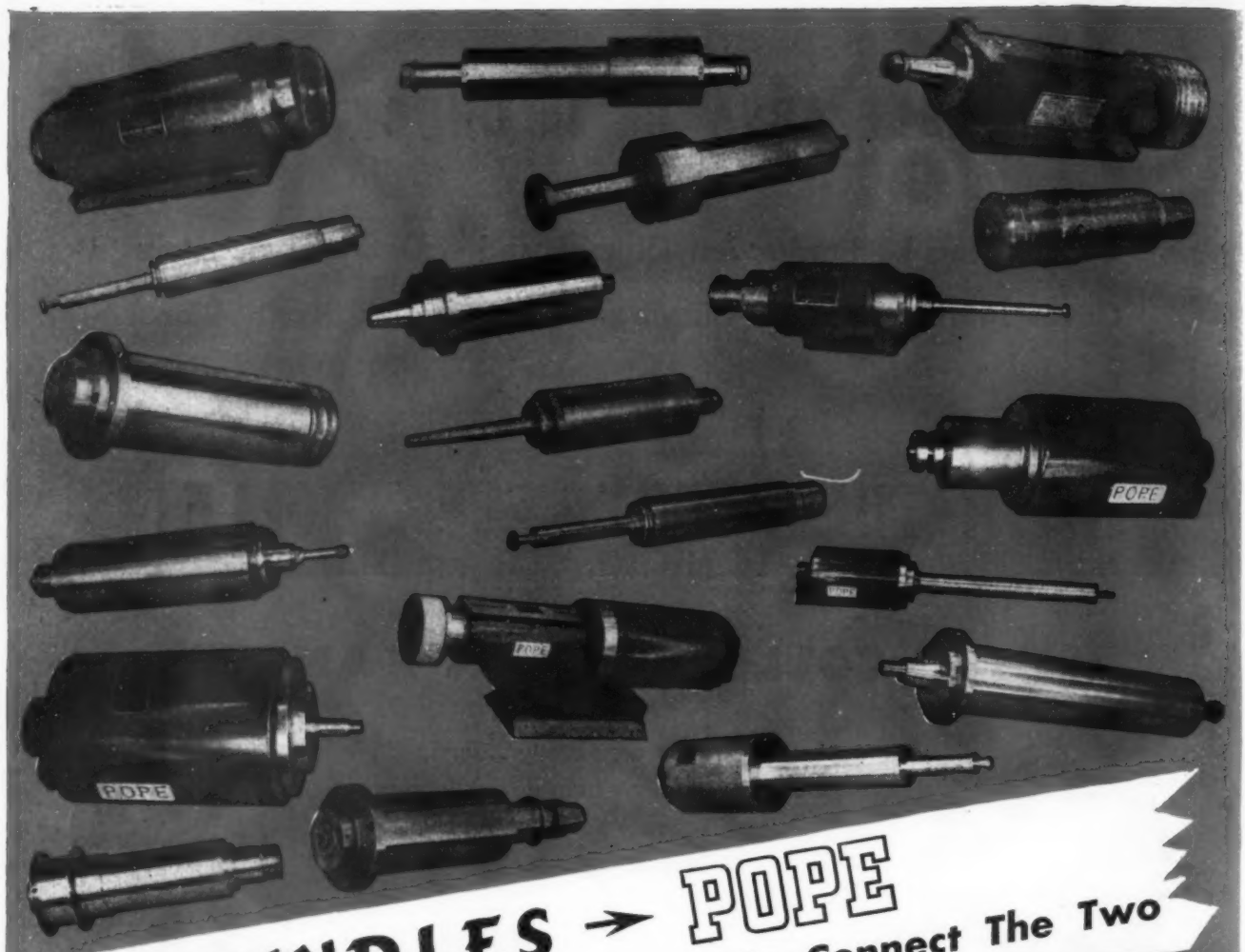


At minimum capacity – Neoprene displaced.



On smaller shanks, jawbites are always parallel and have full length bearing.

Jacobs Chucks THE NATIONAL STANDARD FOR POST WAR PRODUCTION

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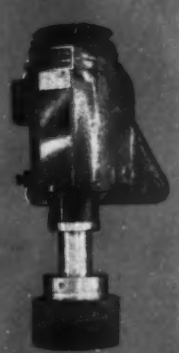
## Why It's To Your Advantage To Connect The Two

Pope has devoted twenty-five years to the design, construction and servicing of Precision Spindles.

**POPE stands for Spindles, and nothing else but!**

Why not experience for yourself the advantages of dealing with the organization that has made Spindles their full time job.

Simply get in touch with



No. 9

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**POPE MACHINERY CORPORATION**

ESTABLISHED 1920

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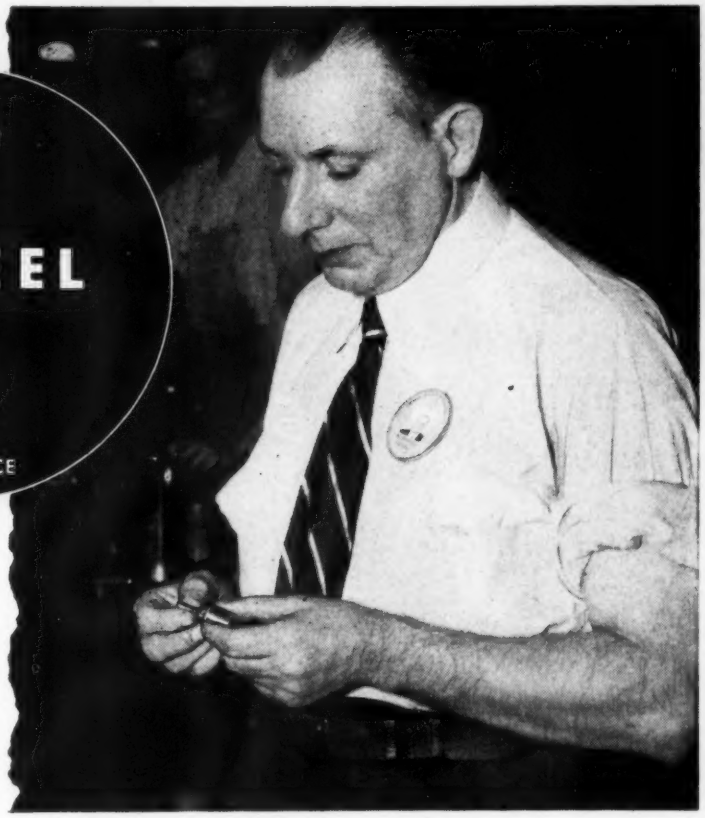
BUILDERS OF PRECISION SPINDLES

# ...and now over 1,100,000 close-tolerance* gagings from that ELGIN Sapphire Gage!

STEWART-WARNER REPORTS

## SAPPHIRE OUTWEARS STEEL MORE THAN 7000 to 1!

*GAGING SHAFT GROUND TO .001 TOLERANCE



Double Ring Sapphire Gage—Used continuously right off the grinders

The Elgin Gage is used "right on the line"—no babying—month after month by Inspector A. N. Nathan. In over a year of continuous usage the gage has required no servicing.

While outwearing 7000 steel gages and 1200 carbide gages, this company—and others, too—have **SAVED** Replacement Gage Costs—Worn Gage Rejects—Gage Checking Time—Production Supervisory Time while **INSURING** continuous, uninterrupted **PRODUCTION.**

Inert, chemically stable ELGIN SAPPHIRE is dimensional fidelity personified. Check the SAVINGS Elgin Sapphire can make for you—even on short runs.

*America's best equipped Sapphire Fabricator*

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**MACHINE WORKS**
**BEVERLY HILLS, CALIFORNIA**

WHEN you think "postwar" you inevitably think of *higher production at lower cost.*

Good cutting fluids, properly applied, are always an important factor in achieving the greatest efficiency in metal working. When you can reduce machine down-time, improve work finish and save tools, your competitive odds are better.

D. A. Stuart Oil Company have been making and applying cutting fluids since 1865—gathering experience that is long, broad and successful—experience that you may use to advantage. Invite a Stuart Oil Engineer into your plant and through him the Stuart Organization will work with you in setting up cutting fluid standards for the top metal-working efficiency you will need for the times to come. No obligation, of course.

The 60-page Stuart booklet, "Cutting Fluids for Better Machining", contains interesting facts about cutting fluids and their application. *Write D. A. Stuart Oil Company, Limited, 2733 So. Troy Street, Chicago 23, Illinois.*

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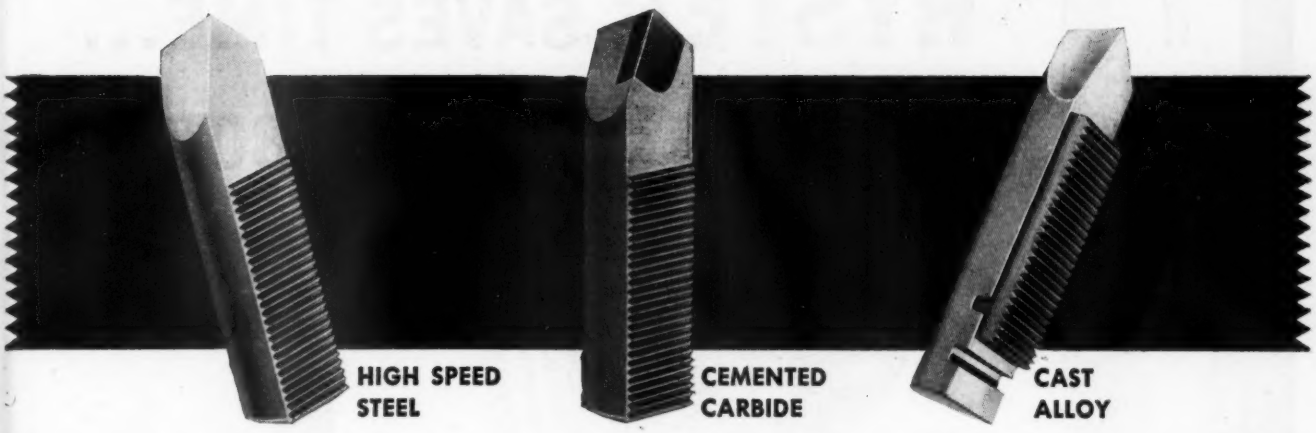
LIMITED
ESTABLISHED 1865
Stocks in Principal Metal-Working Centers

# LOVEJOY POSITIVE LOCKING BLADES



HIGH SPEED STEEL | CEMENTED CARBIDE | CAST ALLOY

## FOR LOVEJOY MILLING CUTTERS AND LOVEJOY TOOLS —CARRIED IN STOCK FOR IMMEDIATE DELIVERY

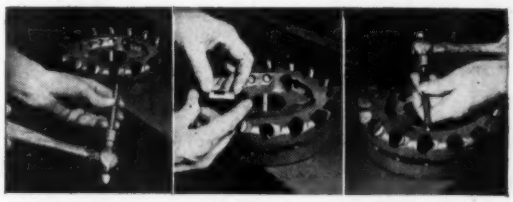
Immediate shipment out of stock is *another Lovejoy service* that backs up the users of Lovejoy milling cutters and other Lovejoy tools. It's a great feeling to know that there will be no delay when you need blades in a hurry. And this service means that there is no need to keep a large stock of Lovejoy blades in your own stock room.

All you need do is check the serial number on the housing of any Lovejoy tool. Write, wire, or phone us this number, and we will do the rest, *immediately!*

You can be sure that the Lovejoy blades that you receive will fit, because of careful manufacture and inspection which insures interchangeability.

*High-speed steel blades* are of highest quality and carefully heat treated for maximum service; *carbide tipped blades* are carefully brazed and finely finished, and you have your choice of any make and grade of carbide; *cast alloy blades* are especially designed to avoid breakage and are available in Stellite, Rexalloy, Tantung, etc.

Lovejoy blades are positively locked in any Lovejoy tool, and over 50% of every blade can be used up before replacement is necessary. Complete details will be found in Catalog No. 27—write for your copy today!



Tap out the wedge— | Move the shoe down— | Tap in the wedge—Grind

**IT'S AS SIMPLE AS THAT!**

Please send me my free copy of "Lovejoy Modern Metal Cutting Tools."

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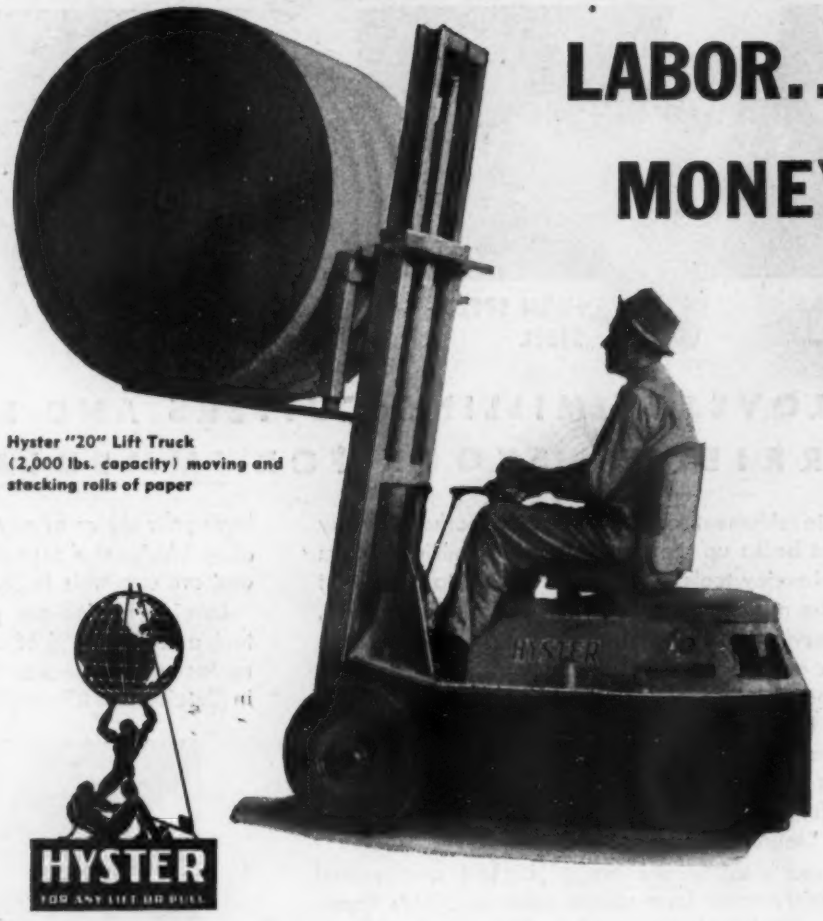
HYSTER

# HYSTER SAVES TIME... LABOR... MONEY




Hyster "20" Lift Truck (2,000 lbs. capacity) moving and stacking rolls of paper

HYSTER

THE BUSINESS that uses a Hyster lift truck cuts the cost of materials handling and makes more money.

In factory, field, or warehouse a Hyster pays for itself by its ability to speed up handling operations and to slash handling costs.

Mechanically, a Hyster is the result of specialized research, design and engineering on what a lift truck should do and how it must perform under all conditions. All Hysters are equipped with pneumatic tires and are gas powered. They hoist, move, stack and transport loads quickly and efficiently. They are used by a long list of civilian industries and by the armed services of the United States and other nations.

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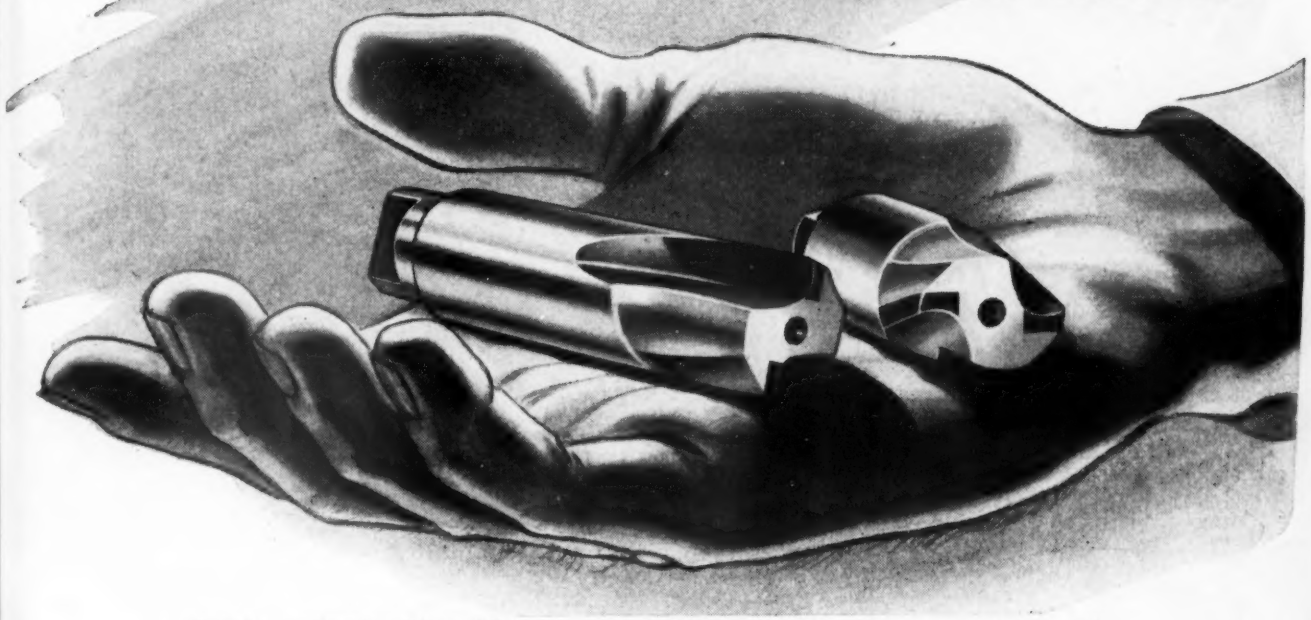
Portland 8, Ore., U.S.A.

Pioneers in Materials Handling Equipment.

# *We're Running these Midwest Carbide-Tipped Routing Cutters at* 10,000 R.P.M.



*Another example of how Midwest Carbide-Tipped Cutting Tools are helping various industries to obtain increased production and better finishes at lower costs.*

"They're used for vertical profiling on aircraft wing spars made of ⅜ inch sheet aluminum. We're running them at approximately 10,000 r.p.m., and at a feed of 3½ inches per minute."

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Send us your inquiries and metal cutting problems. They will be carefully analyzed and constructive suggestions will be submitted for your consideration.

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If you wish to receive "CUTTINGS" regularly, write us on your company letterhead.

# *Midwest Tool*

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COUNTERBORES • EXPANSION REAMERS • RECESSING TOOLS
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**MORSE** Service applies to a *complete* line of cutting tools. This single source of supply not only simplifies purchase and maintenance of tool stocks, it also assures continuing deliveries of tools in which high quality is constant. Supporting services are the job-side cooperation of Field Representatives and, when required, the cooperation of our Physical, Chemical and Engineering Laboratories. Standardize on Morse Cutting Tools and save yourself time, trouble and money!

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# INGERSOLL D-B-L* HACK SAW STEEL

*Furnished in the original D-B-L Regular,—"5-4" and D-B-L 2,—"6-5"

Whichever Ingersoll D-B-L Steel you specify, you are sure of getting more of all four . . .

- ★ Tough Cutting Edges
- ★ High Impact Resistance
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- ★ Lower Cost

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**BORG-WARNER CORPORATION**
**NEW CASTLE • INDIANA**

PLANTS: NEW CASTLE, IND.; CHICAGO 4, ILL.; KALAMAZOO, MICH.

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# *To Speed* SURFACE PREPARATION of Steel and Copper Before Finishing

## *Enlist* OAKITE COMPOSITION No. *90*

## and benefit from such advantages as . . *1.* Fast, Thorough Smut Removal *2.* High Conductivity *3.* Effective Wetting-out and Emulsifying Action *4.* Controlled Foaming *5.* Long Solution Life.

IS the removal of insoluble smut a difficult degreasing-before-finishing problem in your plant? Do you have trouble with excessive foaming? Are you in a hard water area where calcium and magnesium soaps minimize the effectiveness of your cleaning material? You can solve all of these problems by using that newly developed quick-acting ANODIC degreasing material . . . Oakite Composition No. 90.

The instruction manual illustrated above describes how this scientifically engineered material rids steel and copper parts of insoluble smut, oil, grease, shop dirt and similar foreign matter with unusual rapidity and thoroughness . . . provides the CHEMICALLY CLEAN surfaces so indispensable to the proper adhesion, durability and corrosion-resistance of the subsequent finish. Because solutions of Oakite Composition No. 90 LAST LONGER, it meets the demands of economy . . . helps you keep unit costs LOW!

### *You Can Have This Manual on Your Desk in a Few Days*

If you are doing bright zinc, cadmium, hard chrome, nickel, copper plating or applying black oxide or similar finishes to steel or copper parts, you will want to read this concise, data-packed specially prepared manual. Write for it today . . . it will be on your desk shortly after. No obligation, of course!

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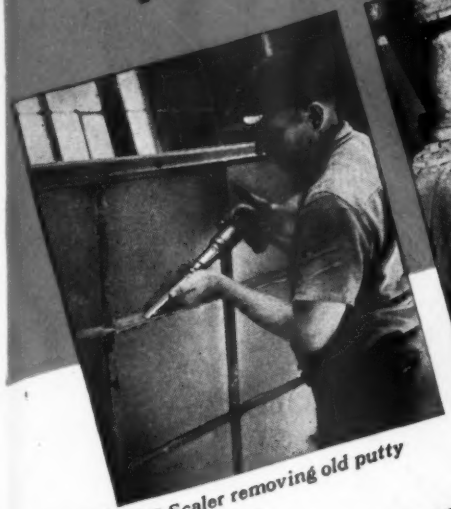
**CLEANING** FOR EVERY CLEANING REQUIREMENT

# Use AIR POWER for PLANT MAINTENANCE

Multi-Vane close quarter drill on repair job

I-R Scaler used for cleaning machinery

I-R Impact Wrench dis-assembling a pump



I-R Scaler removing old putty from windows

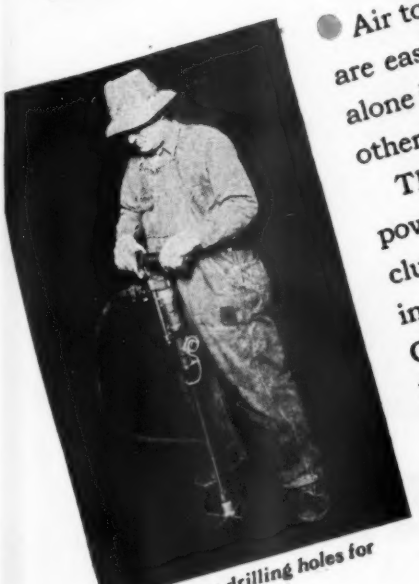
## TOOLS AND COMPRESSORS WILL SAVE MANY MAN HOURS

### THERE IS AN AIR TOOL FOR EVERY JOB

● Air tools deliver *maximum* power per pound. Air tools are easy to control and safe to handle. Compressed air alone is an efficient tool . . . use it for cleaning motors and other machinery.

The illustrations show a few of the many uses of air power for maintenance work. Other applications include: Demolition . . . Digging . . . Back-Filling . . . Tamping . . . Spraying Paint and Insulation . . . Riveting . . . Cleaning Bricks . . . Sanding . . . Sawing . . . Hoisting and Pulling . . . Chipping . . . Chiseling . . . Hammering.

There is an I-R air compressor to furnish the air for all these operations — and an Ingersoll-Rand representative near you who knows Air Power. Send for your copy of "Air Tools," Catalog 5000.



Jackhamer drilling holes for foundation bolts

**Ingersoll-Rand**
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COMPRESSORS
AIR TOOLS
ROCK DRILLS
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OIL AND GAS ENGINES

8-596

SCULLY-JONES

*Style A'*

# TAP CHUCKS

In a standard spindle with a Morse Taper Hole

In Scully Jones Floating Holder

In Floating Tension Type Tap Driver for Magic Chuck

In a Magic Quick Change Chuck

In a Spring Compression Tap Driver

Universally used for individual or modern mass production, the Scully-Jones Style "A" tap chuck is a one-piece tool designed for driving taps in any type of machine having a spindle, holaer or attachment with a Morse taper hole.

True-running, definite stop, positive drive, smaller in diameter than spindle, quick insertion and easy ejection, are advantages that reduce tap breakage and speed up production.

Write for our complete listing of sizes.

*5 Big*

FEATURES

STYLE "A" TAP CHUCKS

1. Drives By Square—a positive drive
2. Centers By Shank—for correct alignment
3. Collet Action—locks tap in chuck
4. Taper Shank—fits any M.T. hole
5. Four Point Bearing—gives collet action

**Scully-Jones AND COMPANY**

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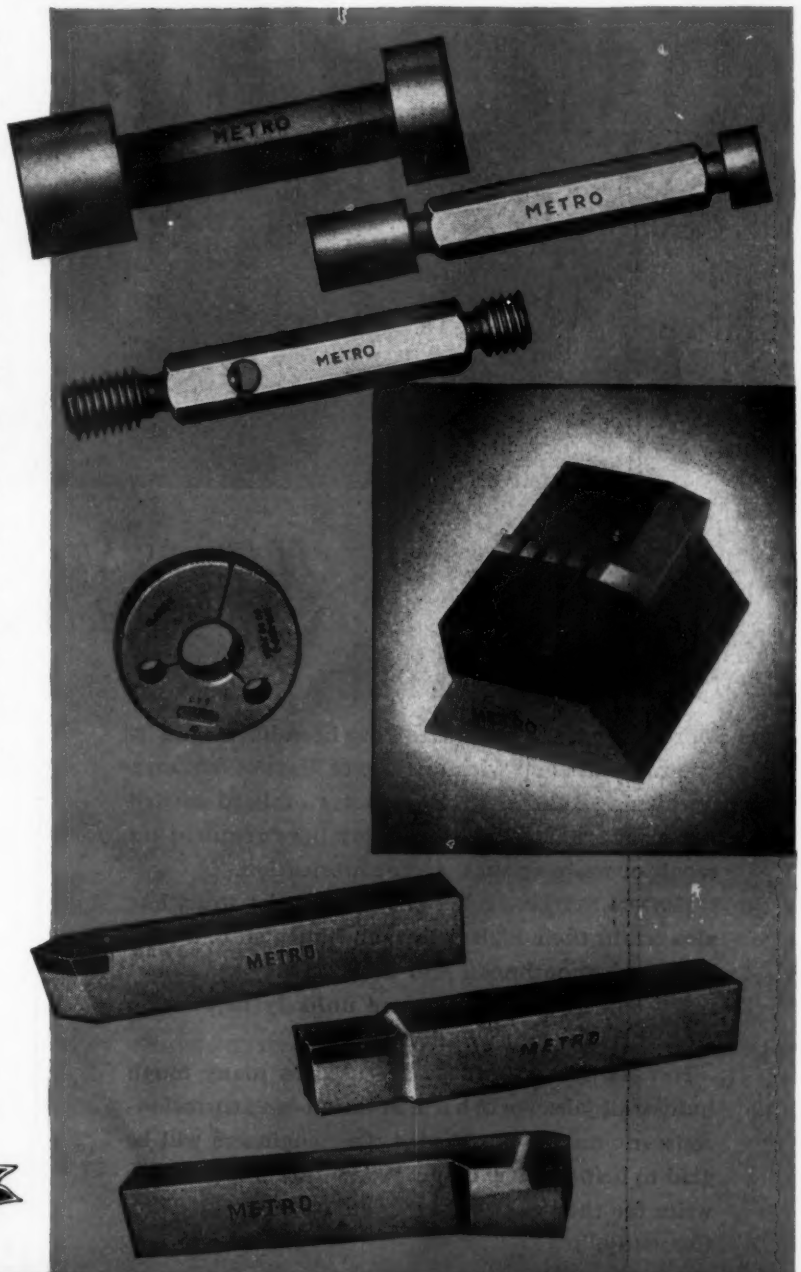
## has studied your requirements

Metro insists that a toolmaker must be around tools IN USE to know everything that can be required of them. Therefore Metro engineers have studied your requirements in order that Metro Precision Gages and Carbide Tipped Tools may serve you better. Standard Tools and Gages available through your Metro distributor.



***Send for Catalog No. 103***

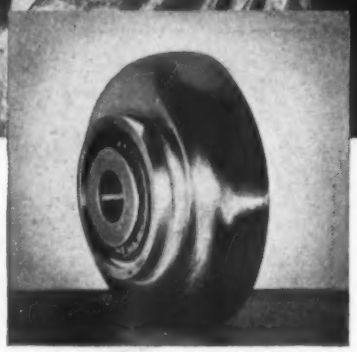
ARMY E NAVY

# METRO

## TOOL AND GAGE CO.

**4240 Peterson Avenue**
**Chicago 30, Illinois**

# Because They Resist Wear
## *and produce an excellent finish*



## *HAYNES STELLITE Burnishing Rollers are widely used in railroad shops*

**More than 100,000 car axles have been burnished in one railroad shop with one set of HAYNES STELLITE burnishing rollers. In eight years of hard service these rollers of cobalt-base alloy have required no repair or maintenance, except lubrication.**

**HAYNES STELLITE rollers not only resist wear, but also retain their high polish, and burnish to a high degree of smoothness. And because they are essentially non-magnetic, they are unlikely to pick up steel particles that will mar the work.**

**HAYNES STELLITE alloys are used in many tough industrial jobs where hard, abrasion- and corrosion-resistant metals are needed. Our engineers will be glad to help you use them. For further information, write for the booklet, "Products of Haynes Stellite Company."**

**In HAYNES STELLITE Alloys you can get these advantages:**

1. **Resistance to wear and abrasion.**
2. **Hardness even at red heat.**
3. **Good mechanical properties at high temperatures over long periods of time.**
4. **Resistance to atmospheric corrosion and corrosive chemicals.**
5. **Low co-efficient of friction.**
6. **Practically non-magnetic.**
7. **Available in the form of castings, small sheets, and welding rod.**

***BUY UNITED STATES VICTORY BONDS AND STAMPS***

ARMY E NAVY

**HAYNES** TRADE-MARK *alloys*

**HAYNES STELLITE COMPANY**

*Unit of Union Carbide and Carbon Corporation*

UCC

General Office and Works, Kokomo, Ind.

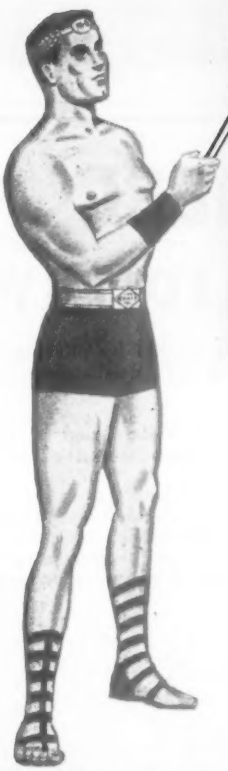
Chicago—Cleveland—Detroit—Houston—Los Angeles—New York—San Francisco—Tulsa

"Haynes," "Stellite," "Hastelloy," "Hascrome," and "Haystellite" distinguish products of Haynes Stellite Company.

# THE BIG THREE

QUALITY Precision Built
DIES · FIXTURES · JIGS · GAGES
are

1. Engineered for maximum production capacity
2. Built Right
3. Priced Right



★ **THE BIG THREE** amount to a policy which we have maintained throughout 16 years of designing and building tools for industry.

If you are interested in tools that measure up to these standards, we will be glad to receive your inquiry.

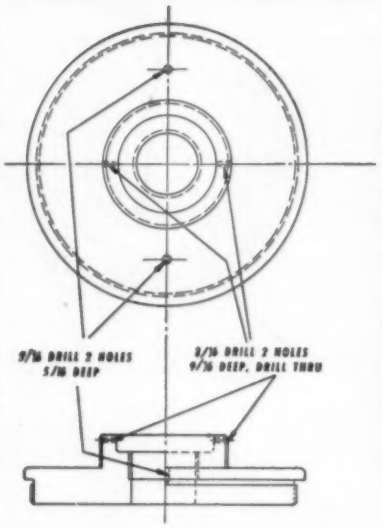
## QUALITY TOOL & DIE CO.

*Manufacturers of "Quality" Products*

401-15 NORTH NOBLE STREET, INDIANAPOLIS 2, INDIANA

# HOEFER 3-Way DRILLING HEAD

## MULTIPLIES CAPACITY OF PRESENT MACHINES IN PRODUCING BASE PLUGS FOR BOMBS

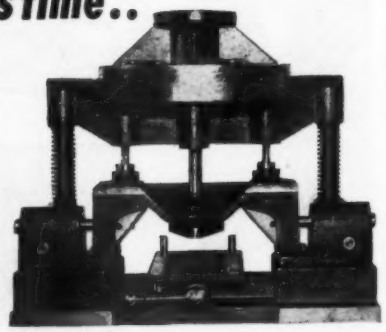



The main or 2-spindle head is driven by the drill press and has two splined drivers near its outer rim which, through bevel gears, drive the two horizontal spindles.

The feeding of all four drills—two vertical and two opposed horizontals—is accomplished by rack and pinion which are covered by the guards shown.

Instead of handling the drilling of the base plug for the four holes from three different directions, one pass of the driller spindle drills all four holes in 1/3 the previous time. Actual drilling time 6 seconds.

## *ONE PASS of the driller spindle drills all 4 holes in one-fifth the previous time..*



Hoefer Multiple Spindle Heads not only increase production per hour but decrease drilling cost per piece. In addition, they increase production from the same floor space, decrease handling time, and lessen operator fatigue. Through use of these drill heads you release needed machines for other work.

★ The use of Hoefer Multiple Spindle Heads on your present equipment will take care of any drilling requirement. When a part becomes obsolete because of re-design, you have only the inexpensive base or support on which the unit is mounted to discard—not the whole machine Hoefer Heads were designed to meet the need for maximum flexibility and they do it efficiently and economically. Give us an opportunity to analyze your drilling problems — send us your blueprints and number of parts you need for one day. We can design a head that will speed your production, save handling time, and save the need for new costly drilling equipment.

*Hoefer's Whole Business is Holes . . . .*

**HOEFER MFG. CO.** *Freeport, Ill.*

# SELECT THE RIGHT WHEEL

## AND SAVINGS WILL FOLLOW

Vitrified makes it possible to standardize on grinding wheels by offering a wide range of standard types which cover practically all wheels used on standard makes of grinding machines.

Selection of the right wheel for the work to be handled is simplified in the Vitrified catalog—a 65-page booklet which gives specific data, dimensions, etc., covering the entire Vitrified line.

Send for this catalog. Choose a grinding operation in your shop on which you would like to cut costs. Select the Vitrified wheel which meets your specifications, try it out, and compare results with the method formerly used—and you, too, will join the long list of progressive manufacturers who have standardized on Vitrified.

*Write for the catalog today*

**VITRIFIED**

**VITRIFIED WHEEL COMPANY**
**WESTFIELD MASS.**

# DOUBLE MAN-POWER OUTPUT

## with Bellows-Senacon Controlled-Air

Bellows Drill Press Feeds and Bellows Air Vises increased production from 800 per hour to 2000 per hour on this fly-cutting operation. One operator runs two presses.

# POWER FEEDS

***Eliminate Hand Feeding of Drill Presses, Milling Machines, Grinders, etc.***

●

***Make Your Hand-Fed Equipment the Equal of High-Priced, Hard-to-get Special Machines.***

YOU can boost production (as much as 50% to 500%) by converting your standard machines to fast, automatic units, with Bellows-Senacon Controlled-Air-Power Feeds.

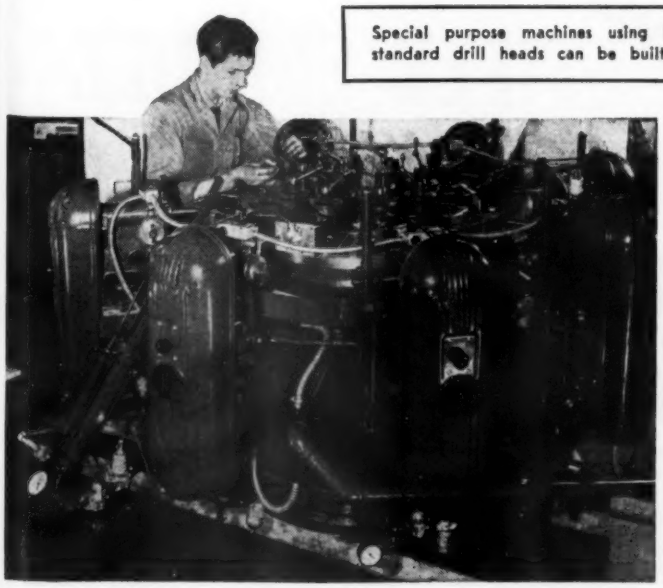
At a touch of the handle, these sensitive Bellows-Senacon feeds advance the work or tool a pre-determined distance, under a pre-determined power thrust, and at a perfectly controlled rate of feed. This unlimited variation of feeding rate (not a series of "step" adjustments) makes it easy to pick just the right feed for stock or tool. Neither too fast, nor too slow. Just right.

Air-driven for speed, and for flexibility in use, hydraulically checked for utmost smoothness without chatter, backlash, or jump, these quickly installed Bellows-Senacon Feeds mean not only greater production, but better production. Idle travel time is reduced, tools stay sharp longer, closer tolerances can be maintained.

And employees like them — for the elimination of repetitive manual operations means less worker fatigue, fewer shop accidents.

Investigate quickly this inexpensive way to boost man-hour output and lower production costs. Strengthen your position in the coming competitive market!

Special purpose machines using Bellows-Senacon Feeds with standard drill heads can be built quickly and inexpensively.



Write today for the new, free, Photo Facts File showing typical installations where Bellows-Senacon equipment increased production 50% to 500%!

**The Bellows Co.**

SENACON DIVISION

861 E. Tallmadge Avenue • Akron 10, Ohio

# THRIFTMASTER

## *High Production* DRILLHEADS

*Save Money*
*Make Money*

The maroon band here featured identifies **THRIFTMASTER** High Production Money Making Drillheads. Your parts blueprints will bring recommendations and quotations. Literature on request.

**DETROIT REPRESENTATIVE:**
**B. E. PARISH • 3340 FENKELL AVE. • DETROIT 21, MICH.**

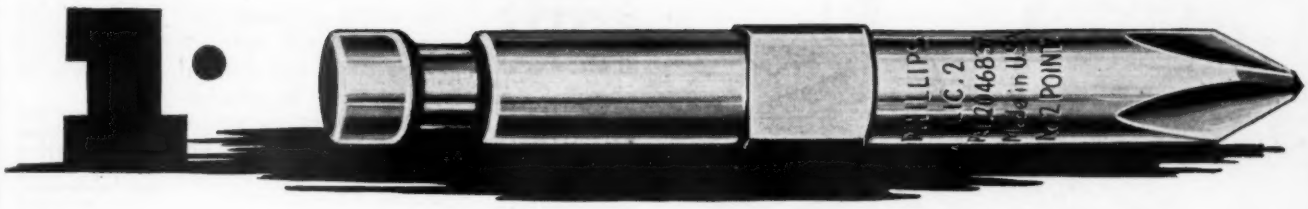
## MULTIPLE SPINDLE *Drillheads*

**THRIFTMASTER PRODUCTS**
Division of
*THOMSON INDUSTRIES, INC.*
Formerly Named ZIMMER-THOMSON CORPORATION
29-05 Review Avenue · Long Island City 1 · New York

Two ways to get

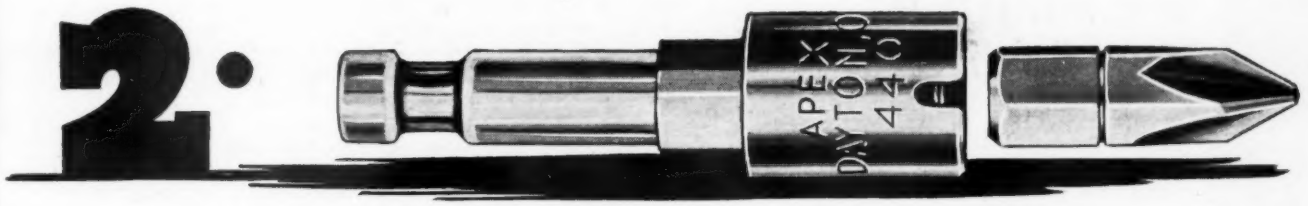
# MORE power bits for LESS

## 1.




You can use the regular Apex-Phillips screw driver bits, and when they are worn, send them back to the factory and have them reconditioned. The cost is only a small fraction of the new bit price. Moreover, reconditioned Apex bits are good as new. They are made of fine shock-resisting steel, heat treated for the right combination of strength and hardness. Send for Catalog 15 and get the complete story.

## 2.




Or you can use the Insert Type Apex-Phillips bits, with Apex holders. These holders are supplied to fit practically every type and make of power driver. Holders accommodate the short, money-saving, steel-saving bits in a full range of sizes. You cut inventory because a few bit sizes fit all holders. You save money. Bulletin 102 gives all the details. So take your choice and, either way, you get MORE power bits for *less*.

# APEX

**THE APEX MACHINE & TOOL COMPANY • DAYTON 2, OHIO**

Manufacturers of Safety Friction Tapping Chucks, Quick Change and Positive Drive Drill Chucks, Vertical Float Tapping Chucks, Parallel Floating Tool Holders, Power Bits for Phillips, Slotted Head and Clutch Head Screws, Hand Drivers for Phillips and Clutch Head Screws, Aircraft and Industrial Universal Joints, Plain and Universal Socket Wrenches.

# Angier
OF FRAMINGHAM

50th Anniversary
1895-1945

## Two preferred war wraps now available to peace-time industry

Two colorful folders illustrate the story. Send for them if you are interested in newer and better ways to protect metal products from corrosion — from all kinds of wet-dirt-moisture damage while in transit or in storage.

How INDUWRAP, because of its exclusive engineered features, won the battle against corrosion for builders of airplane engines and many highly-finished precision parts. How BROWNSKIN GRIZZLYBEAR (A-19) helped to solve the problem of delivering engines safely overseas.

These two wraps, and many others of Angier make, have proved in war their quality-right to lasting preference in peace. They come from the house that has devoted a half-century of protection to the products of our nation and its industries — in peace and war.

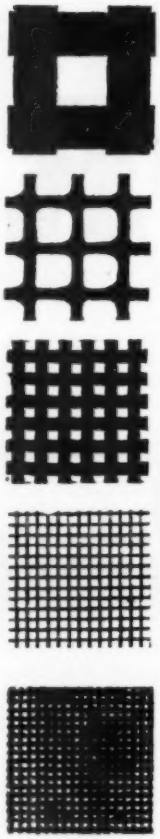
**Overseas customers:** Our export department will be glad to supply full information, samples and quotations on request.

*When writing for samples and literature, please mention by name this magazine.*

Angier

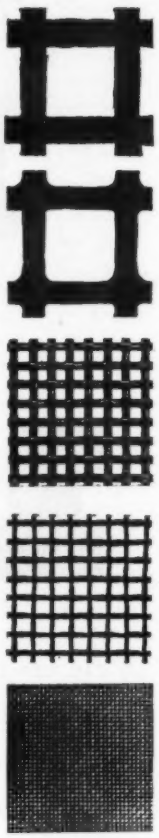
**ANGIER CORPORATION**
CORROSION PREVENTIVE AND WATERPROOF PAPERS
FRAMINGHAM, MASSACHUSETTS





# LUDLOW-SAYLOR

## PRECISION WIRE CLOTHS AND SCREENS FOR ALL INDUSTRIAL PURPOSES



We have been specialists for many years in the making of precision wire cloths, wire screens and woven wire products.

We apply our same precision principles in fabricating wire cloths into finished industrial units, for production or processing equipments or for permanent parts of countless industrial products.

We invite your inquiries for wire cloths of all commercial metals or alloys or weaves, in continuous lengths or cut to size, or processed to meet your individual requirements.

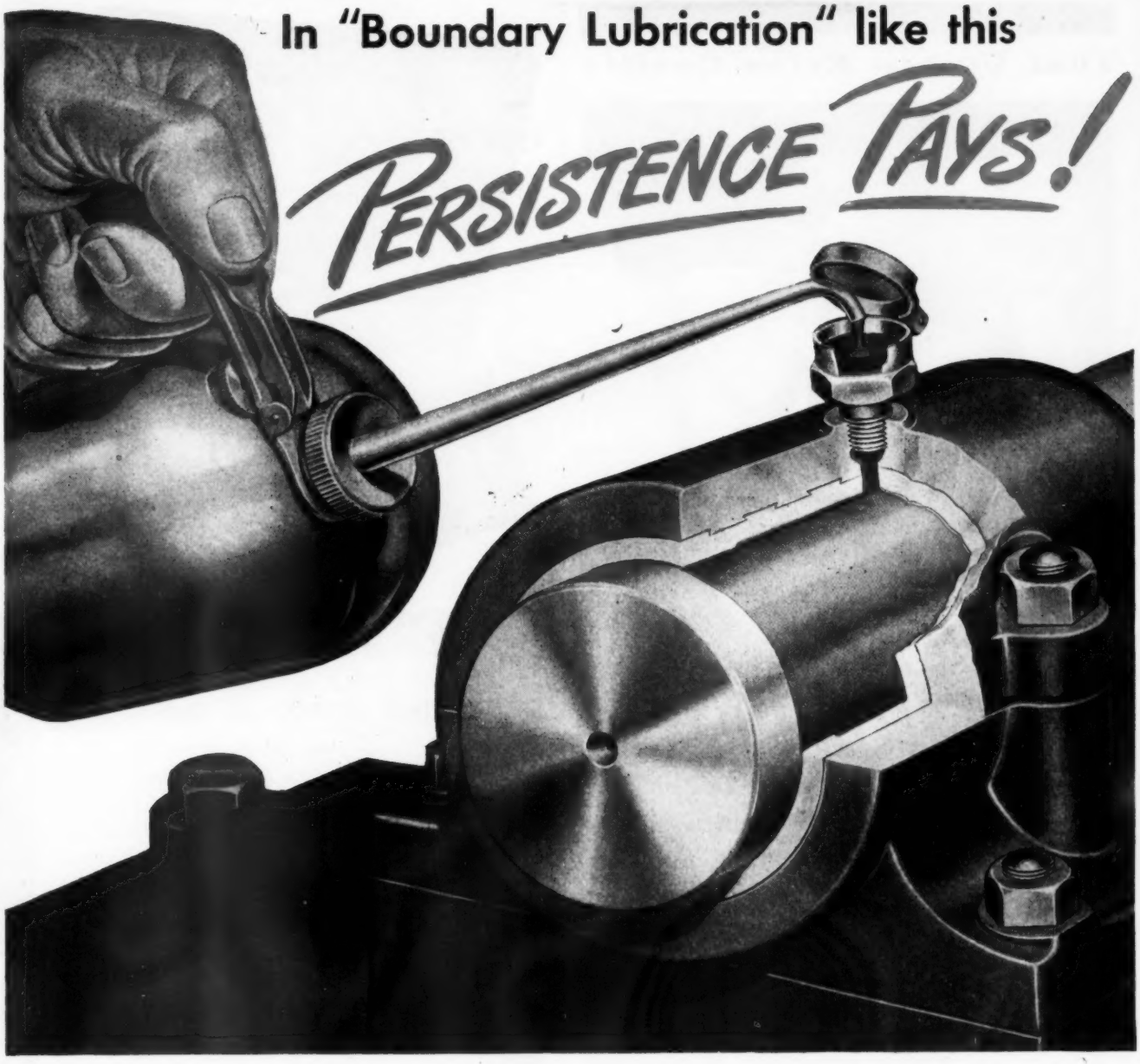
We will follow your specifications and blue-prints exactly as your production engineers have prepared them—or we will submit suggestions for your approval.

| *"Perfect" alloys and metals* | *"Perfect" Wire Cloth weaves* | *"Perfect" Wire Cloth processing* | *"Perfect" Wire Cloth products* |
|---|---|---|---|
| Super-Loy | Arch-Crimp | Bending | Baskets |
| Steel | Coiled | Binding | Circles |
| Galvanized | Double-Crimp | Brazing | Cones |
| Tinned | Double-Fill | Calendering | Crates |
| Stainless Steels | Dutch | Clinching | Cylinders |
| Nickel-Chromium alloys | Filter | Cutting | Discs |
| Aluminum | Flat-Top | Dipping | Forms |
| Brass High Low | Herringbone-Twill | Dishing | Leaves |
| Bronze Commercial Phosphor | Intermediate-Crimp | Flanging | Lengths |
| Copper | Rek-Tang | Flattening | Panels |
| Monel Metal | Selvage-Edge | Forming | Pieces |
| Nickel | Straight-Warp | Framing | Racks |
| Any special alloys available in rod or wire form | Stranded | Galvanizing | Ribbons |
| | Sta-Tru | Painting | Rolls |
| | Triple-Warp | Shearing | Sections |
| | Twilled | Slitting | Segments |
| | Twisted-Fill | Trimming | Spacers |
| | Twisted-Warp | Arc-Welding | Strips |
| | | Gas-Welding | Template Shapes |
| | | Spot-Welding | Trays |

**The LUDLOW-SAYLOR WIRE COMPANY**
**Newstead Avenue & Wabash Railroad**
**ST. LOUIS 10, MO.**

## In "Boundary Lubrication" like this

# PERSISTENCE PAYS!



LOOK THROUGH your plant. You'll find many vital plain bearings where lubricants are applied by hand or by drip-feed devices.

Here the oil drains rapidly, leaving only a microscopic thin film to protect the bearing until the next application. This is called "boundary lubrication," a condition that calls for special oils with a strong attraction to metal.

The answer is Gargoyle Vactra Oils, tailor-made for this "boundary lubrication" problem. These outstanding general-purpose oils form strong, persistent films that adhere to the metal, and resist wiping action and rupture, even when squeezed to microscopic thinness. Applied to all kinds of machinery by hand, bottle-oilers and drop and wick-feed cups, they reduce friction, wear and power consumption to a minimum. See your Socony-Vacuum Representative. Get this persistent protection.

SOCONY-VACUUM OIL CO., INC., Standard Oil of N.Y. Div. • White Star Div. • Lubrite Div. • Chicago Div. • White Eagle Div. • Wadhams Div. • Magnolia Petroleum Company • General Petroleum Corporation of California.

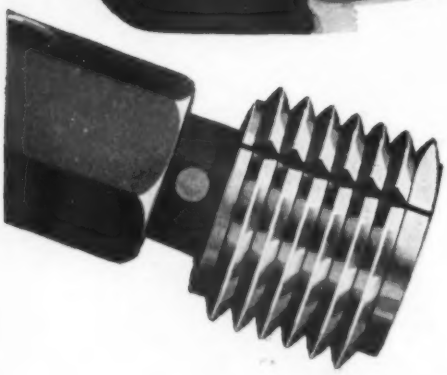
**SOCONY-VACUUM'S 5 Steps to Lower Production Costs:**

1. Lubrication Study of Your Entire Plant
2. Lubrication Schedules and Controls
3. Lubricant Storage and Handling System
4. Skilled Engineering Counsel
5. Progress Reports of Benefits Secured

GARGOYLE Lubricants

TUNE IN "INFORMATION PLEASE"—MONDAY EVENINGS, 9:30 E.W.T.—NBC

## That Unseen Extra Quality



### An Accurate "Pitch" is Necessary

But absolute control of "LEAD" and "ANGLE" as well as "PITCH" is vitally important in a thread gage.

That "Extra Unseen Quality" is evident in each Republic Gage Co. V-nide gage, as reports show lower production costs.

Write for V-nide folder.

**Republic Gage Company**

GAGES OF LONG LIFE ACCURACY

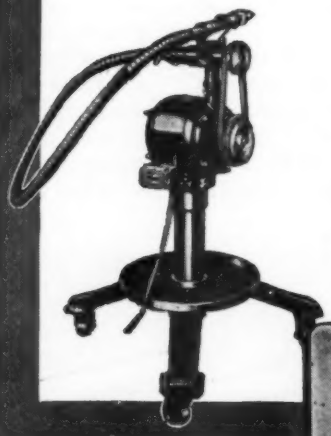
V-nide

2228 FENKELL
Detroit 21, Mich.

SAVE *Critical* TIME!

**TIME CANNOT BE SALVAGED**

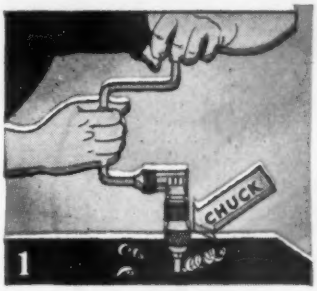
Once it's gone there's no reclaiming it. But you can cut your finishing time 'way down with Haskins Flexible Shaft Equipment. Forget old hand-finishing methods. Your men will work faster and better, with less fatigue, the Haskins way. Every hour will see increased production. Man-hours—plus machine-hours—will really mean something. For important new time-saver methods, send for your copy of Catalog 45. R. G. Haskins Company, 2760 W. Flournoy Street, Chicago, Illinois.



**H-6**

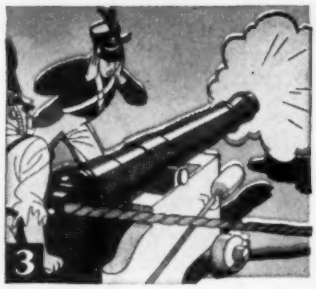
*1/2 H.P. Countershaft drive, 4-speed —900—3400 R. P. M. Bench height pedestal mounting, 360 degree swivel.*

# First you've gotta know what a chuck is

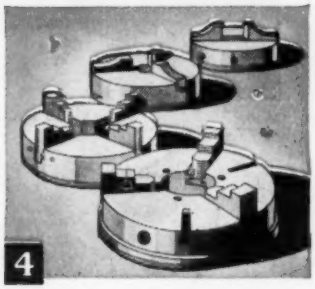



**Chucks** hold tools or work that are in motion.

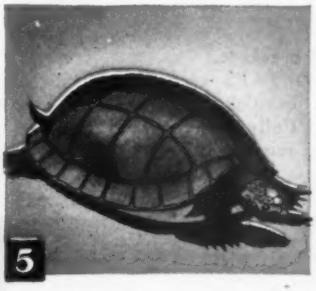
**Chucks** owe their origin to the ancient potter's wheel.



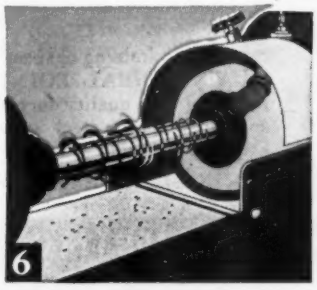

**First chucks** were used for making cannon in War of 1812.



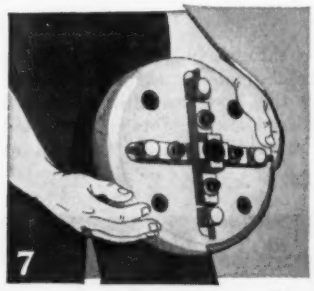

**There are many** kinds of chucks. Here are some in common use.



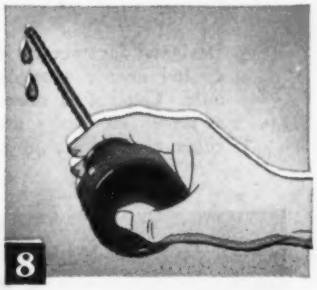

**Many chucks** are too "slow" for modern high-speed production.



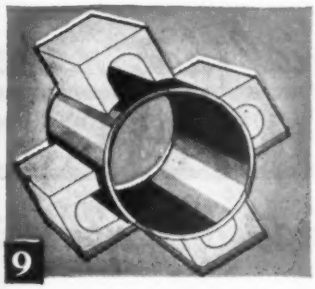

**Other chucks** aren't positively true —lack hair-splitting accuracy.



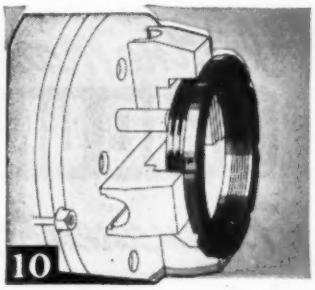

**New and better** is the amazing Woodworth Diaphragm Chuck.



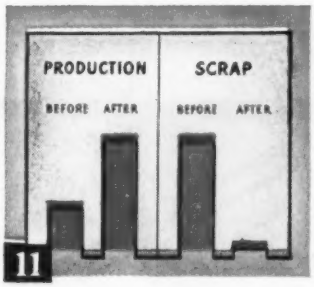

**Jaws fasten** to diaphragm which flexes like bottom of oil can.



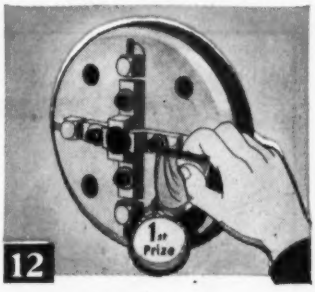

**Thin-walled** parts won't distort in machining to close accuracy.




**Large,** heavy parts can be processed with fine precision.




**Steps up** production 2¼ times—scrap practically eliminated!




**A winner!** Industry acclaims Woodworth Diaphragm Chuck!

## What Woodworth Products Mean to Industry

THE DIAPHRAGM chuck is a typical Woodworth contribution to mass production efficiency. Here's why.

Every Woodworth product must conform to the basic policy of this company—*TO MAKE ONLY PRODUCTS WHICH WILL BENEFIT INDUSTRY THROUGH INCREASED PRODUCTION AND REDUCED COSTS.*

This means that the great demand for Woodworth Tools and Gages will be continuing, especially in view of the coming battle for postwar markets.

And it means that Woodworth engineers have been charged with the responsibility of searching constantly for new ways to speed up and lower the cost of production, in connection with Woodworth Products of the future.

The constant growth and expansion of the N. A. Woodworth Company is due to strict adherence to these objectives.

ACCURACY YOU W CAN TRUST

**WOODWORTH**

N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD, DETROIT 20, MICHIGAN

**PRECISION GAGES**

**PRECISION MACHINED PARTS**

**PRECISION TOOLS**

# CARD SPIRAL POINTED TAPS

*for free, accurate thread cutting in deep holes*

Designed for tapping deep through holes or blind holes drilled deeply enough for chip clearance at bottom of hole. Cutting is done by the first few threads milled at an angle. Chips are forced ahead of tap, preventing chips clogging in flutes, thereby increasing strength of tap and minimizing chances of breakage.

CARD SPIRAL POINTED TAPS assure free cutting, and fine quality threads. Furnished in carbon steel and high speed steel types. Fully described in Card Catalog, available promptly on request.

CARD TAPS ARE SOLD BY LEADING DEALERS EVERYWHERE

**S. W. CARD MANUFACTURING CO.**

Mansfield, Mass., U. S. A.
DIVISION OF UNION TWIST DRILL CO.

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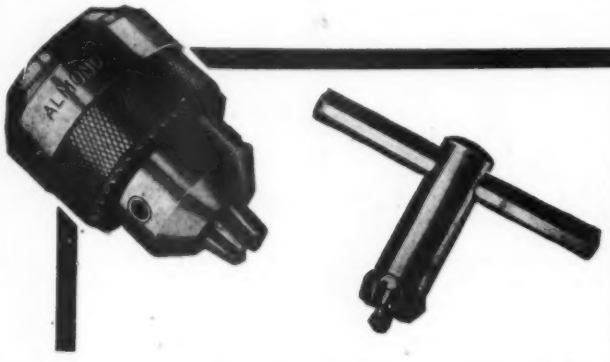
Los Angeles: 524 East Fourth Street



# Almond Drill Chuck

## THE FIRST IN THE FIELD

ALMOND THREE-JAW DRILL CHUCKS were the first to be placed on the market over Seventy years ago. As Pioneers in the field of Drill Chucks, the name "ALMOND" has long been associated with the logical procedure of machine developments. ALMOND DRILL CHUCKS are made in types and sizes to fit all machine tools and portable drills.

*Complete information is available on request.*

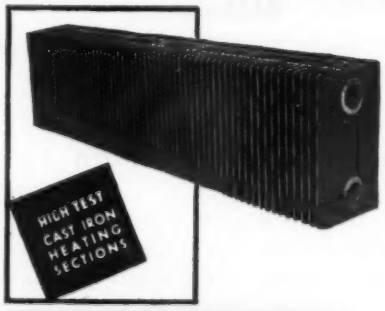
***The Original Manufacturers of Drill Chucks***

**T. R. ALMOND MFG. CO.**
***Ashburnham, Mass., U.S.A.***

*It's the Material that makes*

# GRID UNIT HEATERS

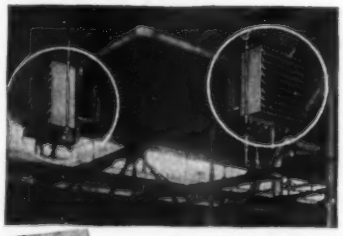
*Permanent Heating Equipment*




ONE piece construction heating sections (patented) of high test cast iron that withstand steam pressure up to 250 lbs.

• No soldered, brazed, welded or expanded connections to become loose or develop leaks.

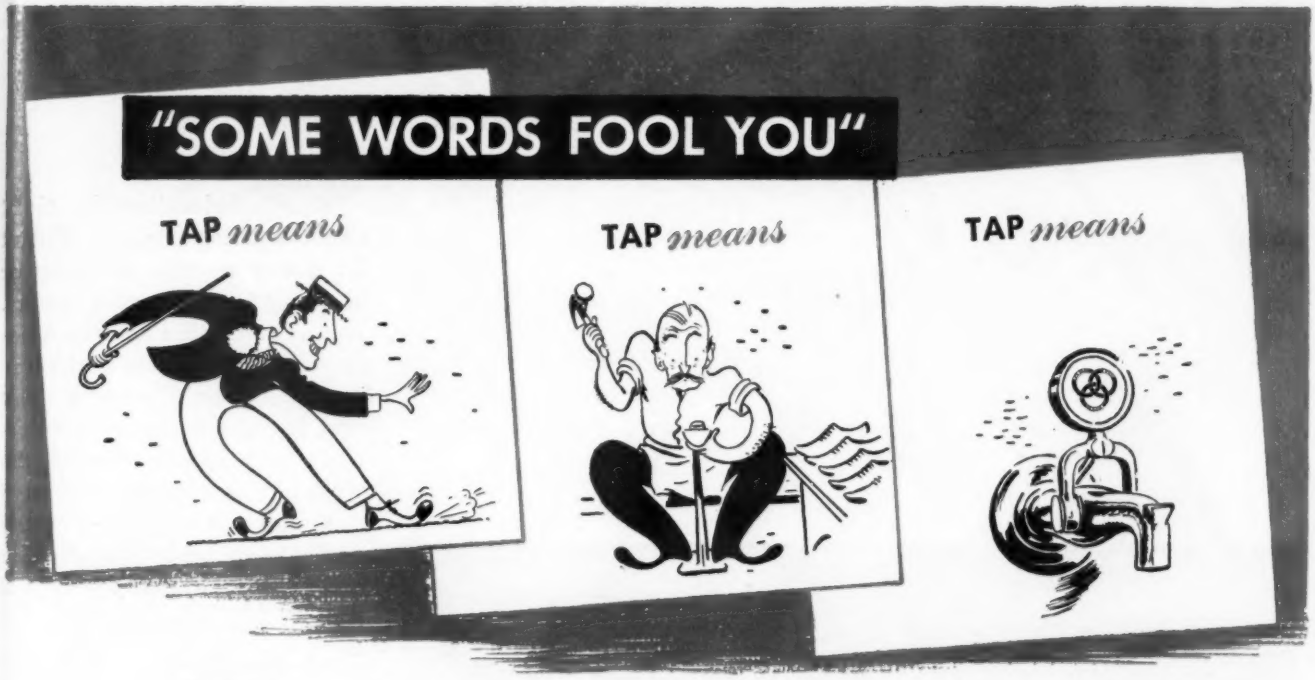
• No electrolysis to cause corrosion, breakdowns, leaks, or heating failures. GRID Unit Heaters are built to last, as is proven by the many plants that have operated them continuously—some as long as 15 years, without maintenance. Complete data and capacity tables upon request.



**SEND** *New booklet "Corrosion in Unit Heaters" that tells you why cast iron withstands corrosive atmospheres—yours upon request*

**D. J. MURRAY MANUFACTURING CO.**
Wausau, Wisconsin

# "SOME WORDS FOOL YOU"




## BUT Threadwell COLD-TEMPER TAP

*Always means*

**QUALITY**
**UNIFORMITY**
**ACCURACY**
***plus* all these *extra* advantages**

COLD-TEMPER treatment (120° below zero) increases both strength and ductility, assures better threads and more of them per tap on steels, cast iron, alloys, plastics.

Color "i-dot-ification" on the shank of every high speed tap—*red* dot for cut thread, *white* for commercial ground, *blue* for precision ground.

Tap-Capsule— every ground thread tap in its own transparent plastic tube, sealed against dirt and damage, visible for size and type *before* unwrapping.

Greaseless rust-proofing— not messy or sticky to handle—always clean, dry and shining, ready for instant use.

"Personal attention" service— a nearby supplier trained to meet your needs and backed by a manufacturing organization that provides intelligent personal attention to every order, large or small, regular or special.

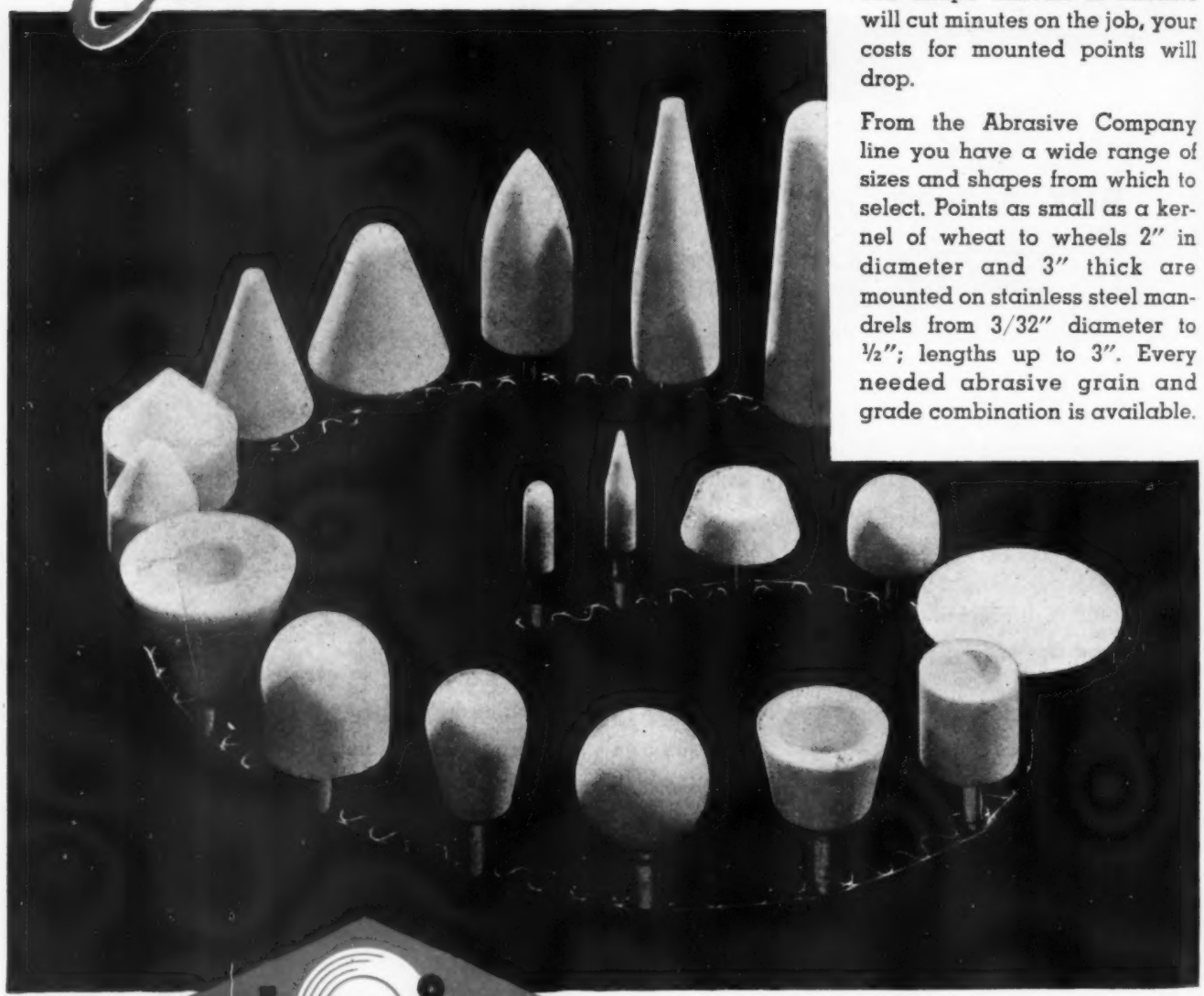
Why not see for yourself what these *tap extras* mean to you. Specify *Threadwell* COLD-TEMPER next time you order high speed taps.

**DISTRIBUTORS IN LEADING INDUSTRIAL CENTERS THROUGHOUT AMERICA**
Canada — Bridge Machinery Company, Montreal
England — Skylux, Ltd., London
Brazil — Alfredo Kramer & Cia. Ltda., Rio de Janeiro, Sao Paulo
Mexico — W. Picard, Mexico, D. F.
and
John H. Graham & Co., Inc. of New York City
*THROUGHOUT THE REST OF THE WORLD*

Threadwell
SINCE 1902
"TAPS OF DISTINCTION"

**THREADWELL TAP AND DIE COMPANY • GREENFIELD, MASSACHUSETTS, U. S. A.**
CALIFORNIA OFFICE, THREADWELL TAP & DIE CO. OF CALIF., 1322 SANTA FE AVE., LOS ANGELES 21

# Take Your Pick and Cut Your Costs



Selecting the right shape and size of mounted point for every specific grinding or finishing job is good business. It often means the difference between extravagance and economy; between excessive costs and low costs. If proper selection can make one wheel do the work that two are doing now; if one shape instead of another will cut minutes on the job, your costs for mounted points will drop.

From the Abrasive Company line you have a wide range of sizes and shapes from which to select. Points as small as a kernel of wheat to wheels 2″ in diameter and 3″ thick are mounted on stainless steel mandrels from 3/32″ diameter to ½″; lengths up to 3″. Every needed abrasive grain and grade combination is available.

**abrasive Company**

*Division of Simonds Saw and Steel Company*

**SPECIAL CATALOG** *of* ***Mounted Wheels and Points will be sent on request.***

ABRASIVE COMPANY • PHILADELPHIA 37 • DISTRIBUTORS IN ALL PRINCIPAL CITIES

*Easy to use ... and so many places to use them*

# BETHLEHEM CARBON TOOL STEELS

Your tailor does not try to make one suit of clothes fit hundreds of different men. But in the case of carbon tool steel, the metallurgist is faced with the task of developing a single product for hundreds of different purposes—so that *your* job of selecting steel will be simplified.

Bethlehem carbon tool steels, with their tremendous range of applications, are the wheelhorses of the tool room. Here are a few of the characteristics that make these steels suitable for so many different tasks:

- ★ High, uniform hardness
- ★ Uniform grain structure
- ★ High abrasion-resistance
- ★ Excellent machineability
- ★ Simplicity of heat-treatment

Because of the high carbon content, special melting technique, and restrictions on incidental elements, Bethlehem carbon tool steels are produced under unusually rigid controls. They are not easy steels to make. But they *are* easy steels to use, as thousands of customers can testify.

When you purchase Bethlehem carbon tool steel in the X, XCL, or XX grade, you are buying a product that is generally regarded as the standard of the industry for hundreds of applications. To make sure that you are not overlooking some of its many uses, check with your nearest Bethlehem distributor.

**BETHLEHEM STEEL COMPANY, Bethlehem, Pa.**
**Bethlehem Steel Export Corporation, New York City**

BETHLEHEM STEEL

**X, XCL, XX ... *members of Bethlehem's BIG 8 Tool Steels***

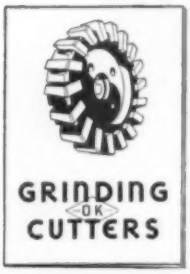
# SPECIAL "NEGATIVE RAKE" MILLERS

## FOR MACHINING STEEL AT HIGH SPEEDS

O K Negative Rake and Spiral Milling Cutters take a "shearing" cut from rear of blade to point, leaving a high finish on steel. This often saves the cost of an extra finishing operation.

Such tools must be made of the very best material, with extreme ruggedness embodied in the design. As great strength and rigidity are inbuilt qualites of O K Milling Cutters, they are a natural base for these new cutters.

O K Milling Cutters are now available. If you have a place for negative milling, it will pay you to investigate the O K System. Glad to make constructive recommendations without obligation wherever possible.




### THIS USEFUL BOOKLET FREE . . .

**This useful booklet is a complete treatise on grinding inserted-blade milling cutters, reamers, counterbores, etc. Profusely illustrated, descriptive matter easy to understand. A valuable booklet in any metal working shop. Sent free.**

INSERTED-BLADE METAL CUTTING

TRADE OK MARK TOOL SYSTEM

MANUFACTURED ONLY BY THE O K TOOL COMPANY, SHELTON, CONN., U. S. A.

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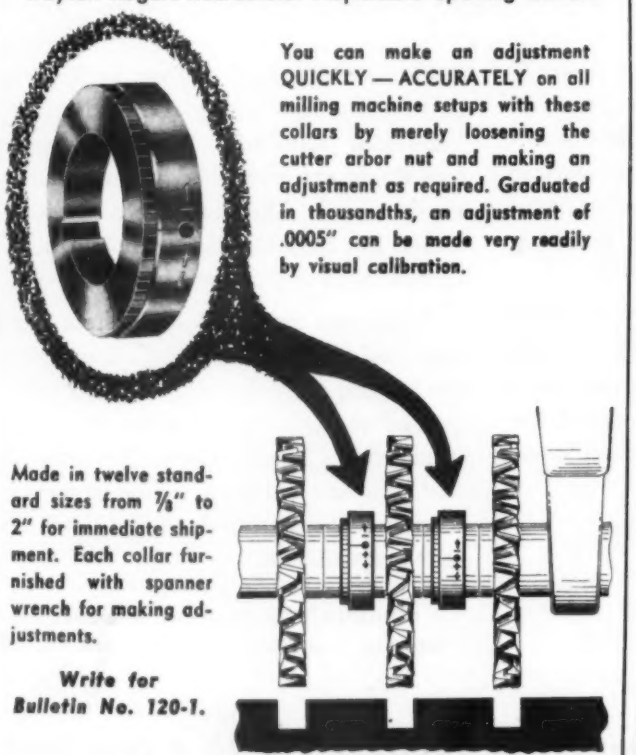
## MICROMETER ADJUSTMENT

on side milling cutters and gang milling setups with Dayton Rogers Micrometer Adjustable Spacing Collars



**You can make an adjustment QUICKLY — ACCURATELY on all milling machine setups with these collars by merely loosening the cutter arbor nut and making an adjustment as required. Graduated in thousandths, an adjustment of .0005" can be made very readily by visual calibration.**

**Made in twelve standard sizes from 7/8" to 2" for immediate shipment. Each collar furnished with spanner wrench for making adjustments.**

***Write for Bulletin No. 120-1.***

**DAYTON ROGERS MANUFACTURING CO.**
MINNEAPOLIS 7 MINNESOTA

---

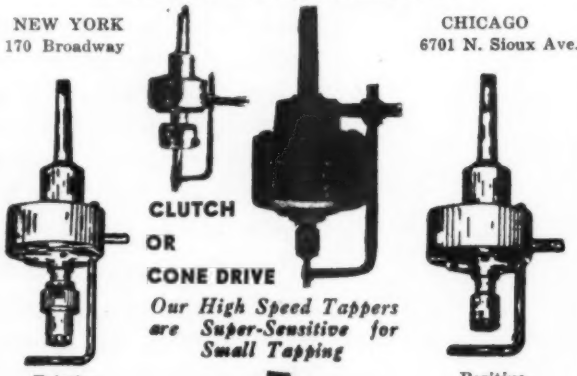
## ERRINGTON MECHANICAL LABORATORY

## TAPPING CHUCKS

**STAPLETON, STATEN ISLAND 4, N. Y.**

NEW YORK
170 Broadway

CHICAGO
6701 N. Sioux Ave.

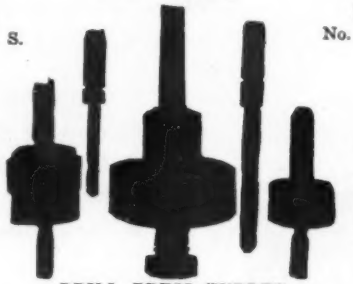


**CLUTCH OR CONE DRIVE**

***Our High Speed Tappers are Super-Sensitive for Small Tapping***

Friction
No. O O C. S.

Positive
No. O O H. S.

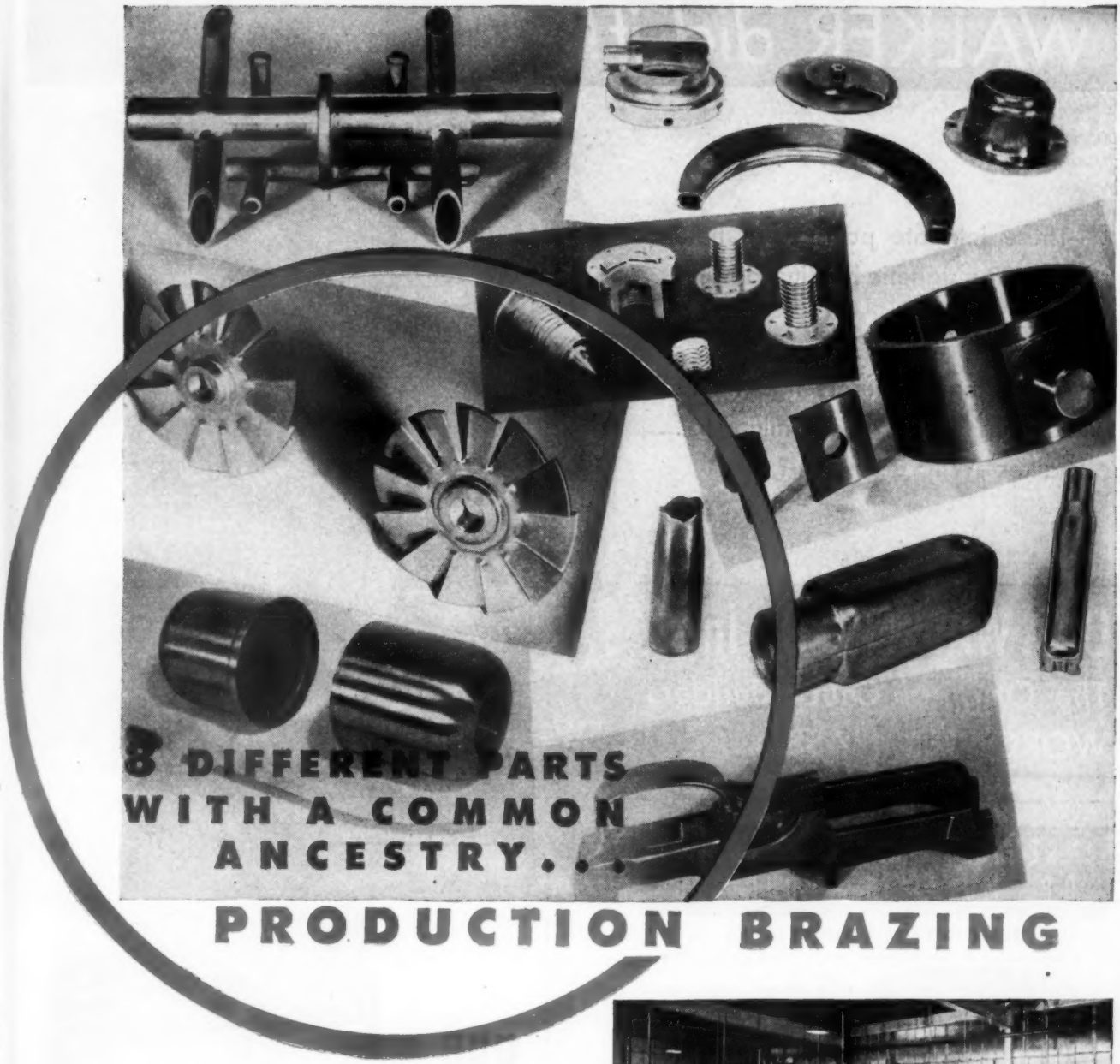


***Style B Positive Stop Holds Work Down***

***Style C Graduated Adjustable Safety Friction***

**DRILL PRESS TURRET**

Style D-E with Quick-Change Tool Holders to Drill, Tap and Set studs, etc., without moving work, or stopping or reversing machine. Individual friction adjustment in each tap-holder. If required. **Also, Opening Die-Heads; Opening Stud-Setters; Friction Screw-Drivers and Nut-Setters, etc.**



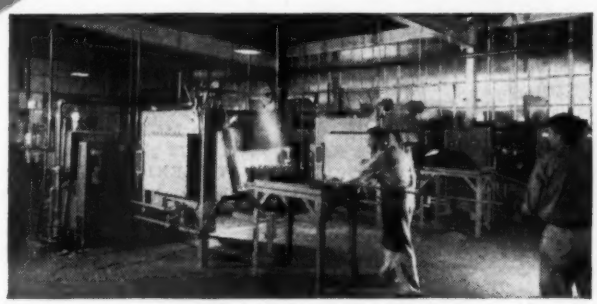

# PRODUCTION BRAZING

Each of these parts represents a tough production bottleneck that was broken by fast, economical "Production Brazing"! Machining was found to be too slow and too costly. Even more important, Production Brazing produced stronger, cleaner parts.

It is very possible that the metal products you now manufacture can be made better, cheaper and faster by Lindberg Furnace Production Brazing.

There's no cost or obligation involved in having a Lindberg engineer study your methods and products. His suggestions and recommendations can be most helpful in maintaining and strengthening your position under the keener post-war competition now at hand.

Write, wire or phone for immediate attention.



*Lindberg Atmosphere Brazing Furnace*

**LINDBERG ENGINEERING COMPANY**
2445 WEST HUBBARD STREET, CHICAGO 12, ILLINOIS

LINDBERG
*Furnaces*

SUPER-CYCLONE • CYCLONE • HYDRYZING • BRAZING

# WALKER *did it!*

—These intricate parts were held on *WALKER* magnetic holding devices.

●

—These manufacturers had their problems solved by coming to Walker—Why don't you?

## O. S. WALKER CO., Inc.

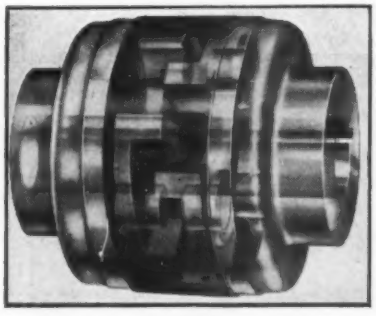
*The Original Chuck Builders*

WORCESTER, MASS.

## INGENIOUS NEW PRINCIPLE "O-P" MULTIFLEX COUPLINGS

**THREE UNIT SAFETY SMOOTH DESIGN**

PATENT NO. 2271388



Today — and in the tomorrow — the transmission of power is a vital factor. MULTIFLEX COUPLINGS were designed to transmit that power under all conditions. MULTIFLEX COUPLINGS give greater MULTIFLEXIBILITY against heavy shock and pulsating loads in any direction, also compensating for ANGULAR AND PARALLEL MISALIGNMENT. So — for insured production order MULTIFLEX COUPLINGS.

**A MASTER-PIECE FOR PRODUCTION**

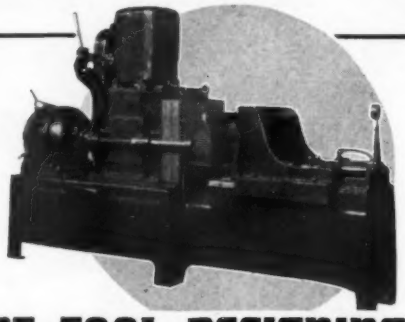
*Insures*

- MULTIFLEXIBILITY
- END FLOAT UNOBSTRUCTED
- NO LUBRICATION
- SHOCK-ABSORBING
- NO MOVING PARTS
- NO SERVICING

WRITE FOR THIS EIGHT PAGE DETAILED FOLDER

AUTOMATIC MACHINE & TOOL CO.
ENGINEERED PRODUCTS
AUBURNDALE, MASSACHUSETTS

132 CHARLES STREET, AUBURNDALE, MASS.

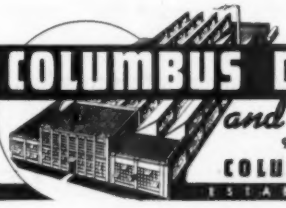


## OUR EFFICIENT TOOL DESIGNING

*..... means better production at a lower cost...*

Correct tool designing means the minimum of operation required to do the job. Our experience enables us to evaluate and interpret correctly your tool designing problems. This means maximum production at a lower cost.

JIGS • FIXTURES • SPECIAL TOOLS
BUILDING COMPLETE MACHINE TOOLS
UNITS FOR MACHINE TOOLS
PUNCHES AND DIES



**COLUMBUS DIE·TOOL and Machine Co.**

945 CLEVELAND AVE.
COLUMBUS 1 OHIO
ESTABLISHED 1906

# Consult a Specialist

## Always sound advice—in health or business.

... and if your business requires precision tools and inspection controls we say ... "*CONSULT VINCO*" ... where highly specialized engineers—each one a specialist in one or more of the many phases of gage design and construction—are continuously engaged in analyzing, perfecting and producing fully detailed methods designed to give an accurate and complete control of the essential elements of a particular job.

The majority of Vinco customers—among whom are found many names that rank high in American Industry—regard this service as an essential when any change in part production is planned. "Check with Vinco" is rubber stamp routine with those who know the value of proper gaging methods prepared by specialists.

**MILLIONTHS OF AN INCH FOR SALE BY VINCO**
REG. U. S. PAT. OFF.

**VINCO CORPORATION, 8851 SCHAEFER HIGHWAY, DETROIT 27, MICHIGAN; SALES OFFICES, NEW YORK, CHICAGO, CLEVELAND**

Semi-Automatic Hydraulic Spline and Gear Grinder • Optical Master Inspection Dividing Head • Involute Checker • Angle Tangent to Radius Dresser • Index Plates • Precision Vises • Sine Bars • Straight-side Spline, Serration Spline, Involute Spline and Helical Spline Plug and Ring Gages • Thread Plugs, Rings and Setting Plug Gages • Spur and Helical Master Gears • Munition Gages • Propeller Shaft and Hub Gages • Built-up and Special Gages • Gear Rolling Inspection Fixtures • Indexing Fixtures • Hydraulic Power Control, Utilization and Distribution Units • Engineering, Design and Development • Precision Production Parts.

# SO...NOW WE'RE BACK WHERE ARITHMETIC REALLY COUNTS...

*This is pre-war stuff.*

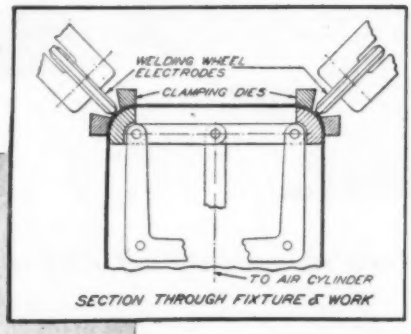
We cite it because it bears directly on the kind of goods you will make from now on, for Joe Civilian . . . remember him?

Production cost savings which must be made to maintain that better-than-pre-war standard of living necessary to your expanded facilities CAN be made in metal working industries by the application of Federal Resistance Welding.

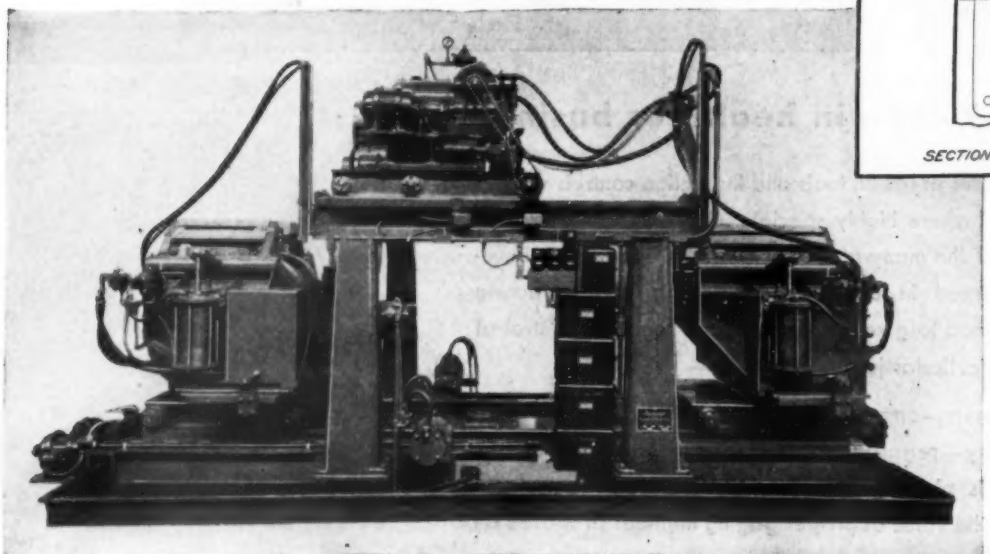
The cost arithmetic shown is from the records of one of the country's leading manufacturers. Three Federal Seam Welders of the type shown on the next page were installed in their plant. Their use resulted in annual savings of $18,000 in costs. A report of 2½ years operation showed the welders had paid for themselves and returned $24,000 profit.

Except for the fact that it is comparatively a modest example, this is typical of direct savings achieved when a product and Federal Resistance Welding are brought together by careful engineering and design. Such records are not limited to any one type of metal working industry. Successful applications cover everything from small parts assembly or joining stainless steel blades to mild steel handles for tools or cutlery, clear through all branches of sheet metal fabrications (including refrigerator liners, casings, grilles and parts) to heavy flash welding of steel ring gear blanks ten or more feet in diameter, with solid cross-sections of eighteen inches.

To find out how Federal Resistance Welding can affect the arithmetic of your particular production problem, send your specifications for applications analysis



SECTION THROUGH FIXTURE & WORK



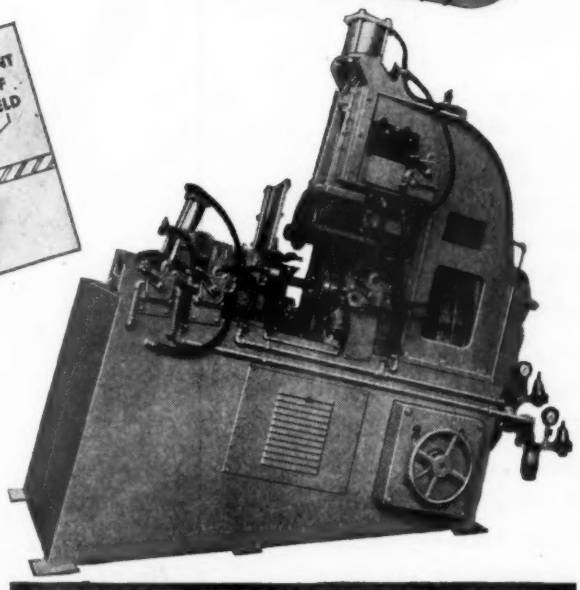
**THIS FEDERAL RESISTANCE SEAM WELDER**

**Seam welds multiple, leak-tight joints like this.**

**INSTALLED BECAUSE IT CUTS COSTS**

**The Federal MACHINE AND WELDER CO**

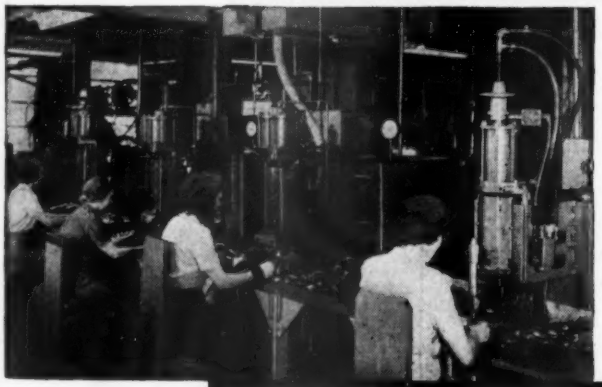
# THIS KIND OF



**THIS FEDERAL RESISTANCE SEAM WELDER**

Seam welds refrigerator casings like this.

**INSTALLED BECAUSE IT CUTS COSTS**



**THESE FEDERAL RESISTANCE WELDERS**

All standard models, attain high production in assembling small parts components.

**INSTALLED BECAUSE THEY CUT COSTS**

MEMBER RESISTANCE WELDER MANUFACTURERS ASSOCIATION RWMA

**230 DANA ST., WARREN, O.**


# VERSATILE MODERN PRODUCTION TOOLS

## NEW HYDRAULIC WELDERS

Two new models of spot and projection welders, hydraulically operated, are described for the first time in detail in Bulletin 4520 issued by The Federal Machine and Welder Company. One type, available in three sizes with 30, 50, or 75 KVA transformers, employs an inverted hydraulic cylinder in which the piston rod is the fixed member mounted on a unique adjustable connection which provides for close timing and quick follow up. A larger model, available in two sizes of 100 and 150 KVA also is described. Complete specifications are listed.

## HOUSEWARE PRODUCTION

Anticipated expansion of houseware production points up the advantages of Federal resistance welding for the fast, low cost application of handles to enameling steel or aluminum pots and pans. Press type welders are used, with dies that permit rapid loading, give production of 500 to 800 handles per hour, depending upon type of handle applied. Cost with one manufacturer is one-fifth previous method.

## HOW TO MAKE PROJECTIONS

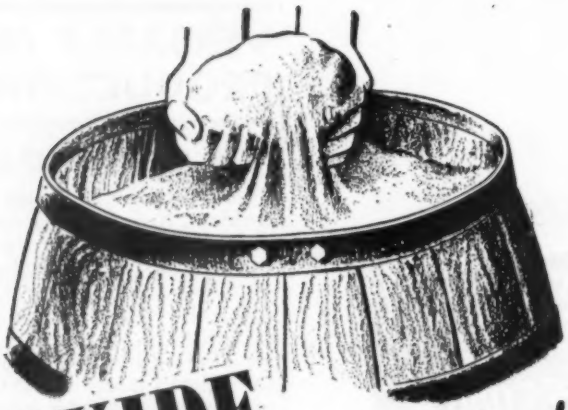
Interesting and useful information on machines and methods for projection resistance welding is included in a new sixteen page booklet just released by The Federal Machine and Welder Company. There are descriptions of various types of projections, tables of proper measurements for projections and complete data on twenty varieties of welders adaptable for either projection of spot welding.

Several interesting special applications are illustrated. These include an eight-station dial-feed fixture for automatic welding of radar tube assemblies at high speed; a dual head for series projection welding; a special fixture for welding aircraft heat exchangers; several air clamping fixtures for quick loading and unloading of work in welding dies; a machine that automatically welds nails to trim moulding.

Special equipment such as rubber heads, air-lock heads and anti-friction slides also are shown. The book is available on request . . . Bulletin 4520.

## FOR CONTAINER MAKERS

A special book of particular interest to container manufacturers is in the list of literature available on request at The Federal Machine and Welder Company. Principal theme is description of a complete steel barrel welding plant. Several special machines for resistance welding a variety of metal containers are illustrated. Bulletin SP 245.



# TROXIDE
## The Safe, New, Effective Pickling-Agent

SAFETY IN HANDLING AND STORAGE . . . complete protection for men and equipment . . . these are only two of the features that make TROXIDE the ideal pickling-agent for industry. A scientifically developed compound of dry, inert chemicals, TROXIDE becomes active *only* when dissolved in water, and can be stored and handled as safely as a barrel of flour!

UNIFORM PICKLING — OVER-PICKLING

When dissolved in water, TROXIDE removes rust and scale from ferrous, non-ferrous and precious metals. TROXIDE'S action slows when clean metal is reached . . . thereby reducing the danger of overpickling. And while it is working, TROXIDE protects workers and equipment from acid hazards by spreading a blanket of safety, called "PROTECTOFOAM," over the pickling solution, preventing the escape of acid particles into the air, and returning them to the solution for useful work.

TROXIDE — ORDINARY PICKLER

Non-inflammable and non-eruptive, TROXIDE in solution forms a combination of the sulphuric and muriatic acid types. A TROXIDE solution equal to the conventional acid-bath cleans a bigger surface area . . . without the acid hazards of the ordinary pickling solution.

**Pin your business card to this advertisement and send it to us today for the complete TROXIDE story.**

**TROXIDE**

**SUPPLIERS — *East:* Safety & Maintenance Co., Inc., New York 1, N. Y. *South, Midwest & West:* Waverly Petroleum Products Co., Philadelphia 6, Pa.**

# IMMEDIATE DELIVERY

## *No. 1 to 60 New High Speed Long Length*

# DRILLS

| No. by Gage | Length | Our Price Net Each |
|---|---|---|
| 1 to 10 | 6¼ | $ .75 |
| 11 to 20 | 5¾ | .75 |
| 21 to 30 | 5⅜ | .75 |
| 31 to 40 | 5¼ | .75 |
| 41 to 50 | 4½ | .75 |
| 51 to 60 | 4¼ | .75 |

***If you buy 60 drills or more — 20% discount***

**VICTOR**
**MACHINERY EXCHANGE INC.**
**251 CENTER STREET**
**NEW YORK N. Y.**

# Facts ON SPECIAL CARBIDE-TIPPED TOOLS BY SUPER!

## SPECIFY SUPER BECAUSE...

**When your cutting job requires special tools for cutting cast iron, steel or non-ferrous materials you'll want SPEEDY PRODUCTION, FINE FINISHES, PRECISION . . . REAL ECONOMY.**

**Super Tool engineers have the knowledge —the production experience, to analyze your needs and to produce the special tools necessary to give you the utmost in efficiency and economy.**

**Super has manufactured Carbide-Tipped Tools exclusively for many years. These years of experience, research and development are your guarantee of tools that do a job.**

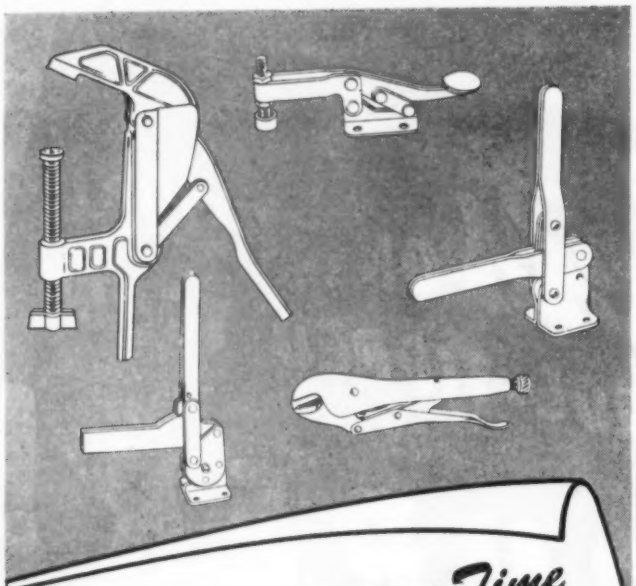
**Next time you need a special tool for a really tough job, specify Super. You'll get SUPER satisfaction.**

**In addition to manufacturing all types of special carbide-tipped tools, Super Tool Company makes a complete line of standard carbide-tipped bits, reamers, plain and side mills, shell end mills, face mills, end mills, counterbores, drills and centers. Specify SUPER and get real satisfaction.**

# SUPER TOOL COMPANY

*Carbide Tipped Tools*

21650 Hoover Road, Detroit 13, Michigan ★ 4105 San Fernando Road, Glendale 4, California



*Convert Clamping Time Into Production Time*

**USE KNU-VISE CLAMPS**

**—that will grip work instantly and release it just as quickly.**

Utilize for production the time you now waste in tightening and loosening clamps on work. Only a flick of the lever is required to apply desired pressure and reverse motion to release.

There is a Knu-Vise clamping device for holding any sized part —under any condition—to meet any space accommodations—for welding, drilling, assembly, or fabricating operations.

Let us show you how you can speed production through better clamping.

Send for complete catalog.

**KNU-VISE** INCORPORATED

2217 Eighth St., Detroit 16, Mich.
4328 San Fernando Rd.
Glendale, Cal.

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**NATIONAL** KEYSEATING MILLER

**. . . the tool that converts drilling machines into key-seaters and saves time and money**

• With this modern tool you can handle keyseating jobs not suitable for keyseating machines on any of your drill presses or radials. Keyseats with parallel sides, accurate in depth and in perfect alignment with bore axis are assured.

The National Keyseating Miller mills, keyseats in one cut. It can be used on taper holes, offset holes, blind holes and for taper keys. Work clamping is unnecessary. We also manufacture oil-grooving millers.

Made in twenty-six different diameters from ½" to 3½". Several widths of cutters can be used in each size.

***WRITE TODAY FOR OUR NEW CATALOG NO. 15***

**NATIONAL MACHINE TOOL CO.**
**CINCINNATI, OHIO**

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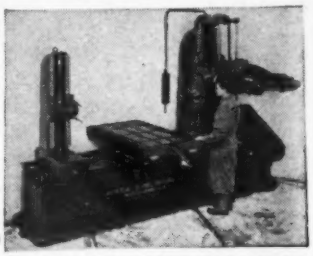
**UNIVERSAL** *Horizontal Boring Machine*
*The only* TRIWAY *Boring Machine Built*

Made in 3" and 4" spindle sizes. Write for complete, detailed specifications.



*Standard Universal 3" Spindle Machine*

**UNIVERSAL BORING MACHINE CO.**
Hudson, Mass., U. S. A.

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**CRAFTS**

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**GAGES AND TOOLS**

*Consistent Quality*

ARTHUR A. CRAFTS COMPANY, INC.

603 Newbury Street
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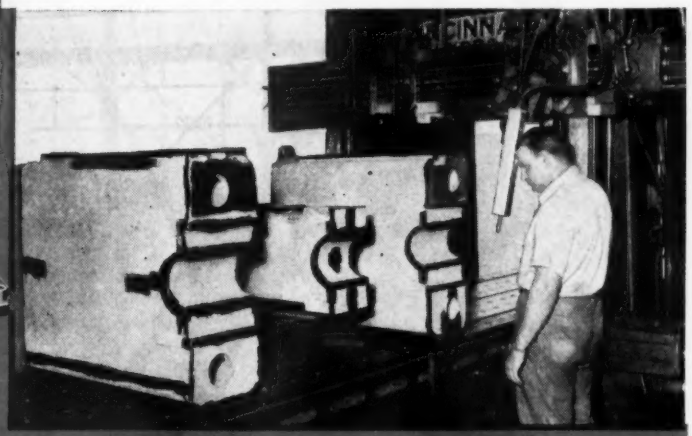
DETROIT · CHICAGO

# MODERN PRECISION WELDMENTS FOR "HEAVY STUFF"!

Modern large-scale precision weldments, made possible by advanced techniques developed during the war, are already proving highly advantageous in the heavy machinery industries. Special weldments, designed, fabricated and finished at Warren City, are replacing steel castings in many important applications. In the Bliss Enclosed Press shown here, the crowns, beds and slides are now Warren City weldments, saving weight and increasing strength. High precision is assured by accurate normalizing, stress relieving, machining and testing, with the finest and most modern scientific methods and equipment.

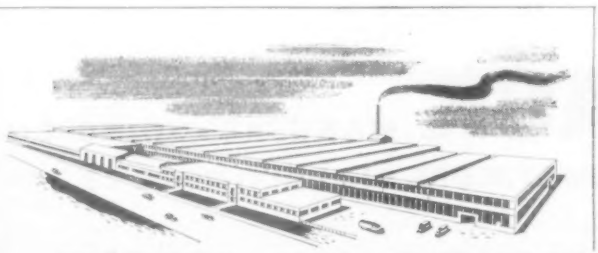
*Finishing a precision-tested Bliss press crown, fabricated from welded steel plates at Warren City*



## WELDMENTS SAVE WEIGHT, ADD STRENGTH, IN FAMOUS BLISS INDUSTRIAL PRESSES

### *Eliminate Pattern Costs and Casting Defects!*

IF YOUR PROBLEM involves the use of heavy steel castings or weldments, be sure you don't overlook the unusual production facilities and know-how available to you at Warren City Manufacturing Company. Located in the heart of the Cleveland-Pittsburgh industrial area, our huge seven-million-dollar plant contains every modern device for handling, cutting, fabricating, welding, normalizing, machining, assembling and testing heavy steel machinery, parts and equipment. Whether, as in the case of the E. W. Bliss Company, your situation may call for redesigning your present steel castings to enjoy the many advantages of modern precision weldments, or whether your need is simply for extra production capacity without increasing the size of your plant, our engineering staff will be glad to offer you their recommendations without obligation. Write today for our illustrated brochure, including a complete listing of our modern and extensive facilities.



**WARREN CITY MANUFACTURING COMPANY** ★★★

DEPARTMENT E

WARREN, OHIO

Wholly Owned Subsidiary of
GRAHAM-PAIGE MOTORS CORPORATION

*Headed your way*

THE NEW BLACK ARROW LINE of Gas Cutting and Welding Apparatus. Black Arrow is the new, packaged line of high quality, precision-built Gas Cutting and Welding Apparatus. Products range from complete outfits through a broad selection of torches, tips, regulators, accessories and supplies.

You'll hear more about Black Arrow from your local distributor—soon.

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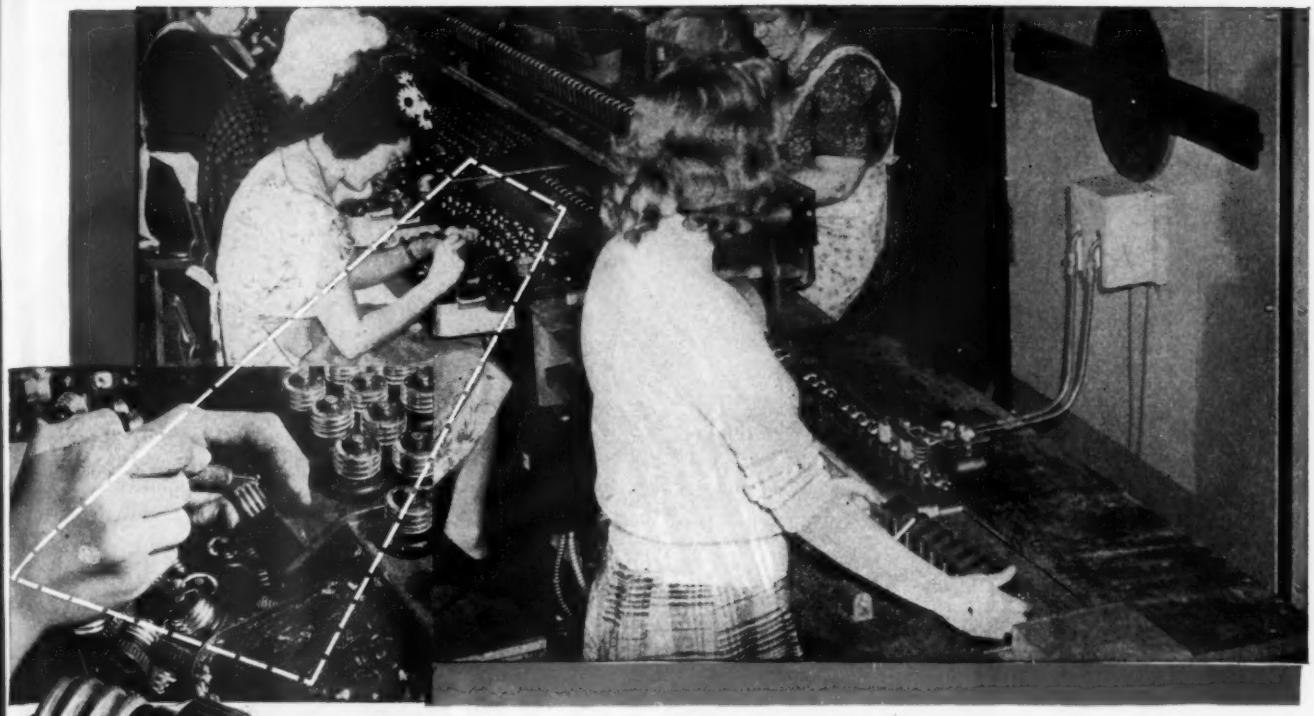
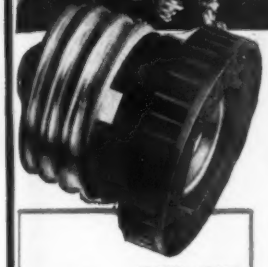
**The BLACK MANUFACTURING CO.**

**1416-1428 W. BALTIMORE ST., BALTIMORE 23, MD.**

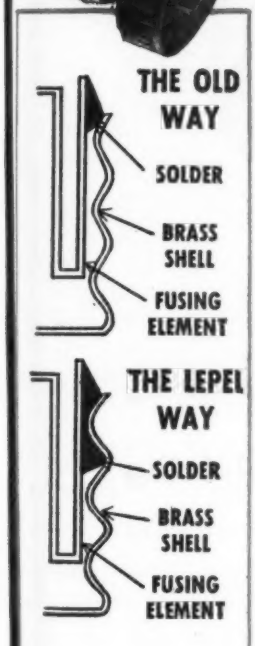
**FORMERLY THE ALEXANDER MILBURN CO.**

**PIONEERS IN GAS CUTTING AND WELDING APPARATUS SINCE 1907**





# How "Economy" makes better plug fuses faster with Lepel Induction Heating




When the progressive management of Economy Fuse & Manufacturing Company wanted to improve the quality of its plug fuses, it was natural to turn to Lepel High Frequency Induction Heating, the modern metal joining method that is contributing so much to product improvement and production efficiency.

Formerly, the zinc fusing element was laboriously soldered to the brass screw shell by hand. This produced a shallow edge union and worker efficiency was impaired by heat and fumes from the battery of soldering irons.

Today, the fuse assemblies with solder wedges manually "tucked in" between fusing element and screw shell are placed in a jig (solder facing upward) and conveyed through the area of a high frequency work coil operated from a Lepel Unit. The solder melts instantly and, with the assembly tilted slightly, flows by gravity, completely filling the element channel and establishing a firm, recessed bond between the parts that insures utmost dependability.

Soldering is performed so fast that twelve girls are kept busy "tucking in" solder wedges.

This is one of scores of metal joining jobs Lepel Induction Heating is doing faster, better, more economically with soldering and brazing alloys of any melting point.

Metals of any analysis — ferrous or nonferrous—and in any form, can be joined quickly by the controlled, measured heat generated by the Lepel Unit, producing quality results never before obtained by other metal joining methods.

By assembling parts with joint surfaces prefluxed and solder or brazing alloy pre-placed, it is possible to produce parts heretofore considered impractical to make by metal joining.

The simple, compact, dependable Lepel Unit requires no special operating skill and can also be used without alteration for localized hardening, annealing, stress relieving or melting.

If you have a metal joining or heat treating problem, a Lepel field engineer will be glad to study it and offer suggestions for solving it by this modern heating method. Just write

**LEPEL HIGH FREQUENCY LABORATORIES, INC.**

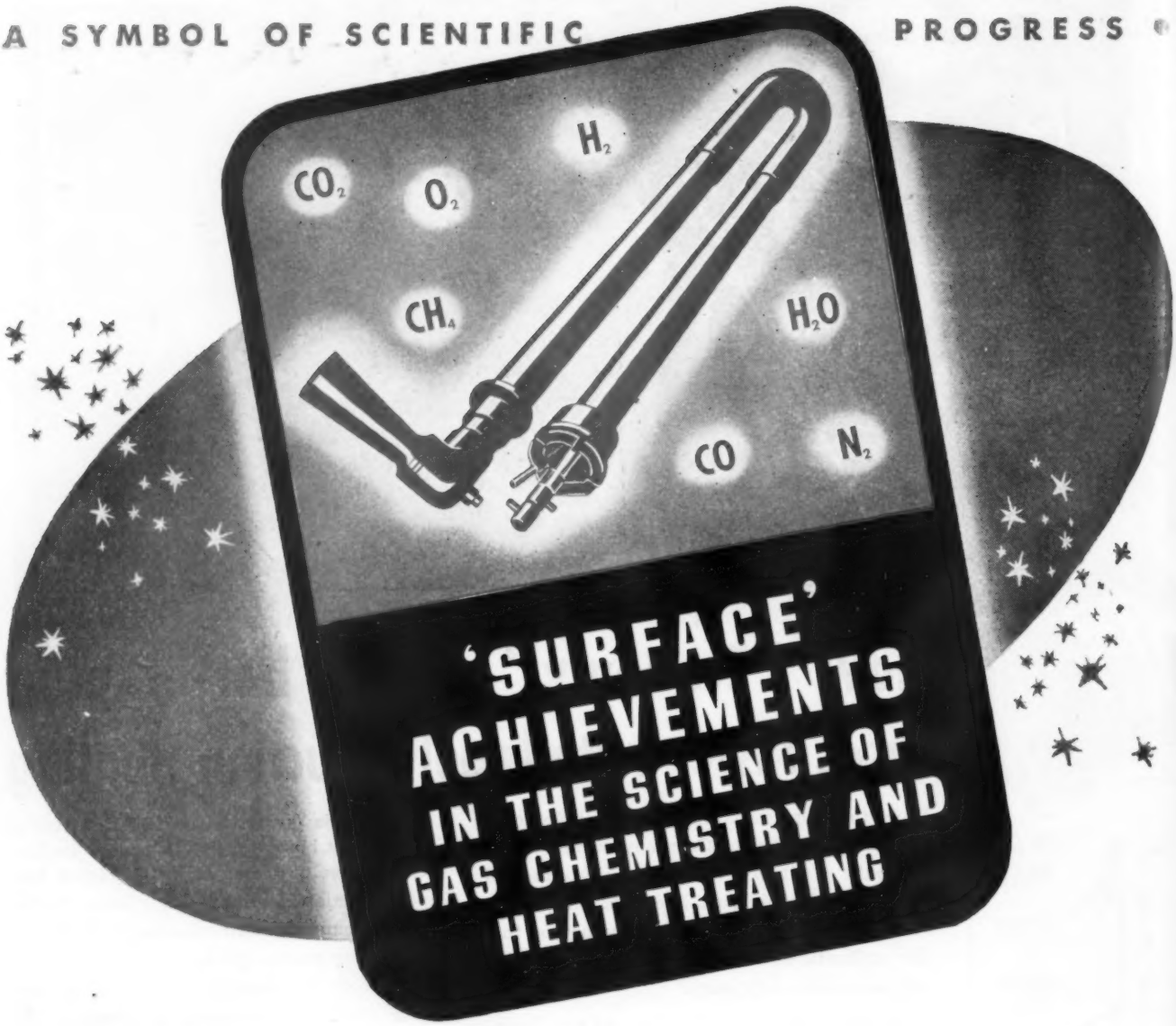
*PIONEERS IN INDUCTION HEATING*

***General Offices:* 39 West 60th Street, New York 23, N. Y.**

*Lepel Units are now available without priority*

**DO IT FASTER, BETTER, MORE ECONOMICALLY BY LEPEL INDUCTION HEATING**

A SYMBOL OF SCIENTIFIC PROGRESS




'SURFACE' ACHIEVEMENTS IN THE SCIENCE OF GAS CHEMISTRY AND HEAT TREATING

- Gas Carburizing and Carbon Restoration (Skin Recovery)
- Clean and Bright Atmosphere Hardening
- Bright Gas-Normalizing and Annealing
- Dry (gas) Cyaniding
- Bright Super-fast Gas Quenching
- Atmosphere Malleableizing
- Atmosphere Forging
- Specific Effects upon Metal Surfaces

'Surface'

ARMY E NAVY

STANDARD AND SPECIAL INDUSTRIAL FURNACE EQUIPMENT FOR:

Forging, Normalizing, Annealing, Hardening, Drawing (Direct-fired and Convection), Carburizing, Nitriding and Heating. Special Atmosphere Generators. *Write for bulletins.*

SURFACE COMBUSTION CORPORATION · TOLEDO 1, OHIO

**DEMONSTRATING FURTHER VERSATILITY OF THE TWIN RAM HYDRAULIC UNITS**

✓ 7 HOLES DRILLED

✓ 1 HOLE BORED

✓ 4 HOLES SPOTFACED

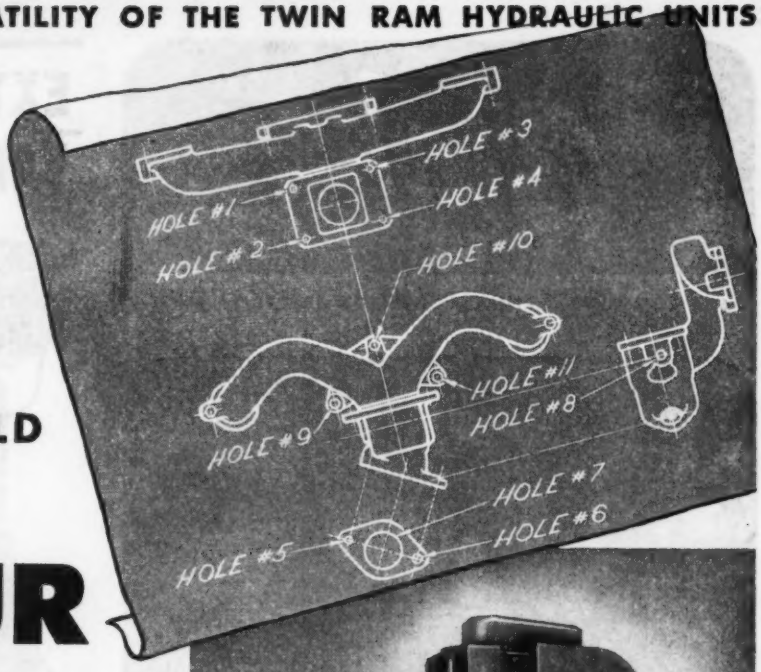
✓ 1 HOLE TAPPED

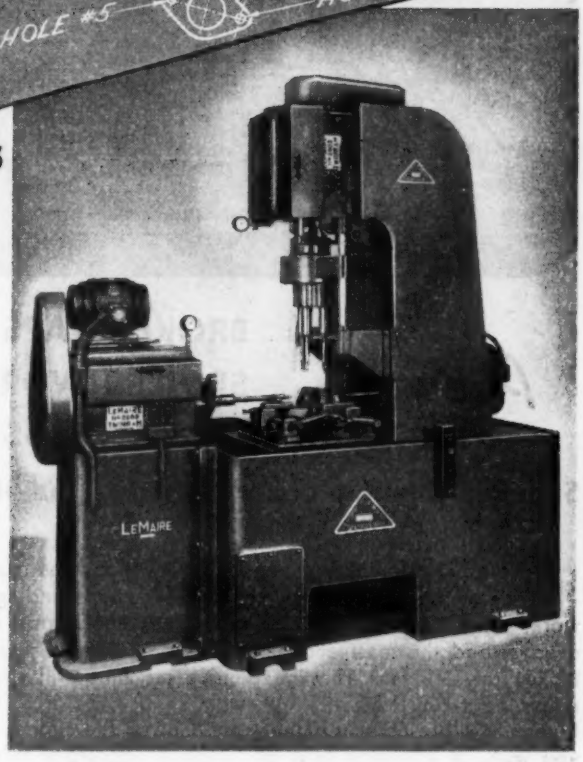
## IN EXHAUST MANIFOLD

*at rate of*

# 80 an HOUR

## ON THESE TWO SPECIAL MACHINES





**This Special LeMaire 3-Way Horizontal Machine** comprises three standard LeMaire No. 2000 Twin Ram Hydraulic Units mounted on three end bases all fastened to a rigid, fabricated center base, making a special machine for drilling and boring automobile engine exhaust manifolds. The Rear unit drills one 27/64" hole (8), the Left unit drills 4 holes 11/32" (1, 2, 3, 4), the Right unit drills 2 holes 5/16" (5, 6) and bores 1 hole 1.636 (7).

**This Special Spotfacing & Tapping Machine** has a standard LeMaire No. 2000 Twin Ram Hydraulic Unit mounted on one end of rigid, fabricated base and a No. 0 Tapping Unit mounted on the other end. An open type column supports a standard No. 2000 Unit to drive the vertical 3-spindle head.

The Left Unit spotfaces back of ⅞" hole (6), the Vertical Unit spotfaces 3 holes ⅞" (9,10,11), and Right Unit taps 1 hole ⅜-16 (5).

*These companion machines serve to illustrate the versatility of uses offered by the LeMaire Twin Ram Hydraulic Power Units. They have almost an unlimited range of adaptations. They present an efficient way of building special purpose machines quickly, simply, and economically. Ask our engineers to discuss your new production problems with you. Send for folder giving complete information about Twin Ram Hydraulic Power Units.*

LeMaire

**LEMAIRE TOOL & MANUFACTURING CO., 2657 SO. TELEGRAPH RD., DEARBORN, MICHIGAN**

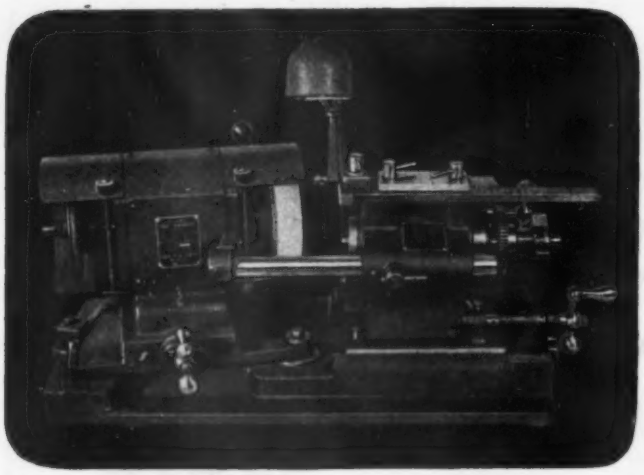
**Builders of unit and way type machines for single or multiple spindle drilling, boring, reaming, tapping, etc... Twin Ram Hydraulic Power Units.. Match-It Gear Chucks**

EDWARD

# Blake

COMPANY

634 COMMONWEALTH AVE., NEWTON CENTRE 59, MASS.



*Prevent* { BROKEN TAPS
SPOILED WORK
BAD THREADS

**Sharpen taps the accurate way—the Blake Tap Grinder way.**

Worn taps are trouble-makers. They overload the machine—produce undersize threads—cause broken taps and spoiled work. The most economical way is to keep taps sharp *always*, and the most economical way to do this is on the Blake Tap Grinder. This inexpensive machine will sharpen *either right- or left-hand taps* with 2, 3, 4, 5, 6, 8, or 10 flutes. It will grind any amount of relief on the chamfer that you wish. It will keep taps at "original" accuracy throughout their life, and will prolong their life so that every penny's worth of value is received.

***Illustrated catalog No. , fully describes and illustrates the two standard models. It will pay to send the coupon for your free copy.***

***No machine is better than the cutting edge of the tool it uses.***

**— MAIL COUPON TODAY —**

*Please send me Bulletin No. 544 which describes the Blake Tap Grinder in detail.* A.M.

NAME_____ TITLE_____

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BLAKE TAP GRINDERS—FILTAIRE PORTABLE DUST COLLECTORS—AMERICAN TOOL HOLDERS—BLACK DIAMOND PRECISION DRILL GRINDERS—WALTHAM CUTTER SHARPENERS

# EXTREME FLEXIBILITY *for* VARIED TOOL ROOM JOBS

Linley has designed and built this Milling and Jig Boring machine expressly for fast and accurate tool-room work. It is compact, rigid and easy to operate, changeovers being quickly made to accomodate die and model making, metal patterns, jigs, etc.

It will unscramble congested schedules and keep your larger machines for their rated capacity. Toolmakers' valuable time is saved, profits earned. 8 speeds from 275 to 4250 r.p.m., velvet feed, no backlash in quill travel, table size 7" x 17½", floor space 18½" x 20".

**DETAILS IN BULLETIN**

# LINLEY

**BROTHERS COMPANY**
664 STATE ST. EXTENSION
BRIDGEPORT 1, CONN.

# GRINDING WHEEL DRESSER

*Desmond Cutter*

*Desmond Hex Dresser*

We manufacture a complete line of Dressers and Cutters. Write for copy of catalog "A".

**DESMOND-STEPHAN MFG. CO.**
URBANA, OHIO
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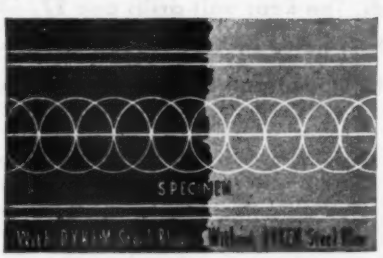
# DYKEM STEEL BLUE

***STOPS LOSSES***

**making dies & templates**




simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

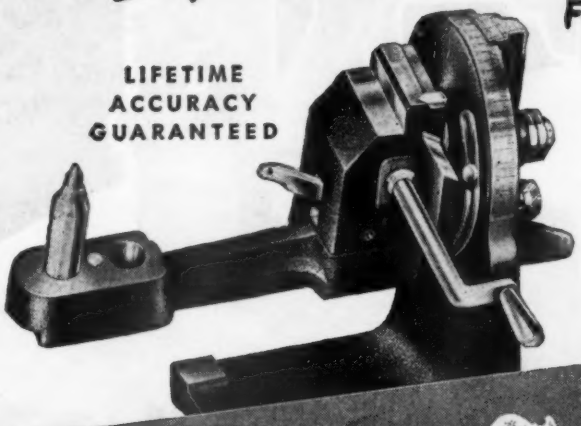
*Write for full information*

**THE DYKEM COMPANY, 2301 B N 11th St., St. Louis, Mo.**
In Canada: 444 Pacific Ave., Toronto, Ont.

# Bley CONTOUR DRESSER

## FOR SHAPING GRINDING WHEELS

LIFETIME ACCURACY GUARANTEED



FOR ABSOLUTE PRECISION IN THE FORMING OF GRINDING WHEELS: ANGLES, RADII AND THEIR COMBINATIONS AND PERFECT BLENDING OF RADII WITH TANGENTS . . .

TYPICAL FORMS MADE ON A SURFACE GRINDER, WITH BLEY CONTOUR DRESSER WITH ARROWED LINES SHOWING EXTENT OF CONTINUOUS TRAVEL WITHOUT A CHANGE OF SET-UP.

**Operates on a totally new and different principle! . . . Guarantees absolute precision and accuracy throughout the life of the fixture! Priced to meet the needs of the small shop—and priced so that purchase of several is practical for the larger shop.**

1 **Precision is guaranteed for the life of the fixture. Guaranteed accuracy of repeated redressing of grinding wheels at a tolerance of less than .0005″**

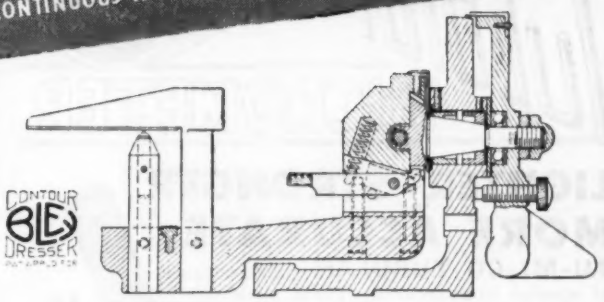
2 **Even the most complicated "setup" can be made right on the bench.**

**Capacity: grinding wheels up to 14″ in diameter. (A special arm extending capacity to 24″ diameter is available.) 3″ male and 3″ female radii. Total of 2″ lineal travel for angular work. Tangents: 1″ on either side of radius.**

Est. 1925

## GOLCONDA DIAMOND PRODUCTS CORP.

3414 NORTH KNOX AVENUE • CHICAGO 41, ILLINOIS




## BLEY CONTOUR DRESSER

### WITH 9 DIAMOND TOOLS

| | |
|---|---|
| 90° GOLCONE shaped point..... | $ 3.50 |
| 60° GOLCONE shaped point..... | 4.00 |
| CRYSTAL point..... | 3.50 |
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| *Rattail Tools For Semi-Circular Radii* | |
| 1/8″ Rattail, radii from 0.250″.... | $ 7.50 |
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| 1/16″ Rattail, radii from 0.030″... | 8.50 |
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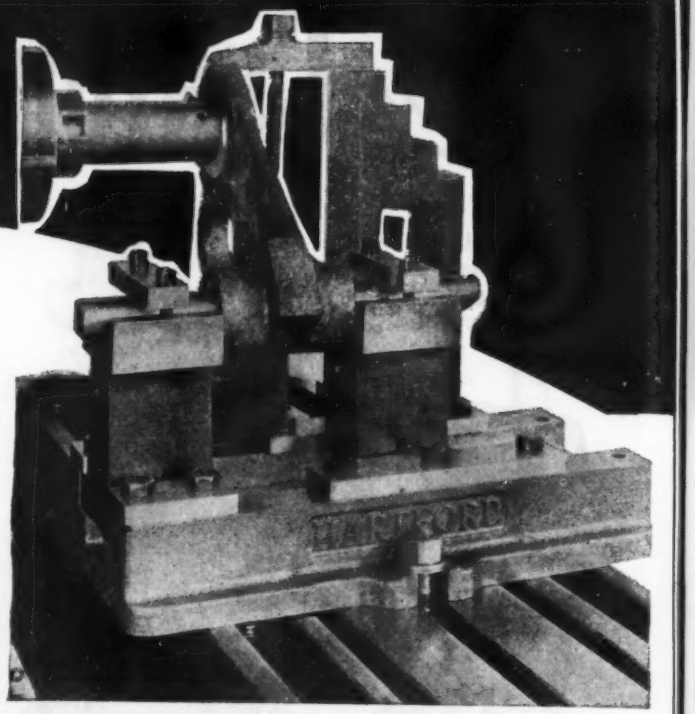
6 EXTENSION SLEEVES and
1 RATTAIL TOOL ATTACHMENT
*ALL FITTED IN FINE HINGED WOOD INSTRUMENT CASE*

PRICED COMPLETE

**$207.50**

SET-UPS OF IRREGULAR WORK
ARE EASILY MADE...
WHEN YOU USE THE
**HARTFORD V-BLOCK FIXTURE**




DESIGN and construction of the Hartford V-Block Fixture are such as to make it a device of extreme versatility as well as a time saver in setting up and handling difficult, irregular work.

Here is shown a typical application involving boring. Note how this irregular piece is simply set up and the secure means provided for holding it. Not only is one hole accurately bored or drilled, but the other hole positioned so that it will be bored parallel to the first without change in set up.

The Hartford V-Block fixture is applicable also to milling, drilling, reaming and inspection. An accurately machined and scraped base provides for precise mounting on surface plates. Ample clamping facilities are provided for holding base to machine table and for holding work in accurately hardened and ground V-blocks.

*Send for literature showing some of the many uses to which the Hartford V-Block Fixture may be advantageously applied.*

*The* HARTFORD SPECIAL MACHINERY CO. HARTFORD 5, CONN.
*Makers of the famous HARTFORD SUPER-SPACER*

Tubular FEATHER TOUCH MICROMETER

**LIGHTER-STRONGER**
**MORE ACCURATE**

**TU-MI-CO TUBULAR** construction of special homogeneous grain structure steel is 25 to 50% lighter than solid frame, yet highly shock resistant. Triple plated—copper, nickel and chrome More sensitive feel, easier to use. Low thermal conductivity—combats "walk" in measurement. Tool steel spindle with threads *ground* for accuracy. Adjustment in bushing to maintain alignment Get TU-MI-CO precision. Prompt delivery

89 SIZES AND TYPES

**TUBULAR MICROMETER CO.**
**ST. JAMES, MINNESOTA, U. S. A.**

*DIES* GEO MET RIC *TAPS*
*Right in the Lead*
THE GEOMETRIC TOOL CO.
NEW HAVEN 15, CONN.

*Famous for*
- ACCURACY OF THREADS
- LOW CHASER COST
- ALL AROUND DEPENDABILITY

Bulletins available: General Purpose Die Heads, Insert Chaser Die Head, Threading Machines.

See our Advt. on page 238 Jan. 18, '45, American Machinist

THE EASTERN MACHINE SCREW CORP., 20-40 Barclay St., New Haven, Conn.
*Los Angeles: A. C. Behringer, 324 N. San Pedro St., San Francisco: Guy Reynolds, 494 Vernon St., Oakland, Canada: F. Barber Machinery Co., Toronto, Canada.*

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**Let the SCLEROSCOPE speed up the production of that s so we can blow the Axis to HELL**

*Write for Circular!*

**THE SHORE INSTRUMENT & MANUFACTURING CO., INC.**
9025 VAN WYCK AVENUE
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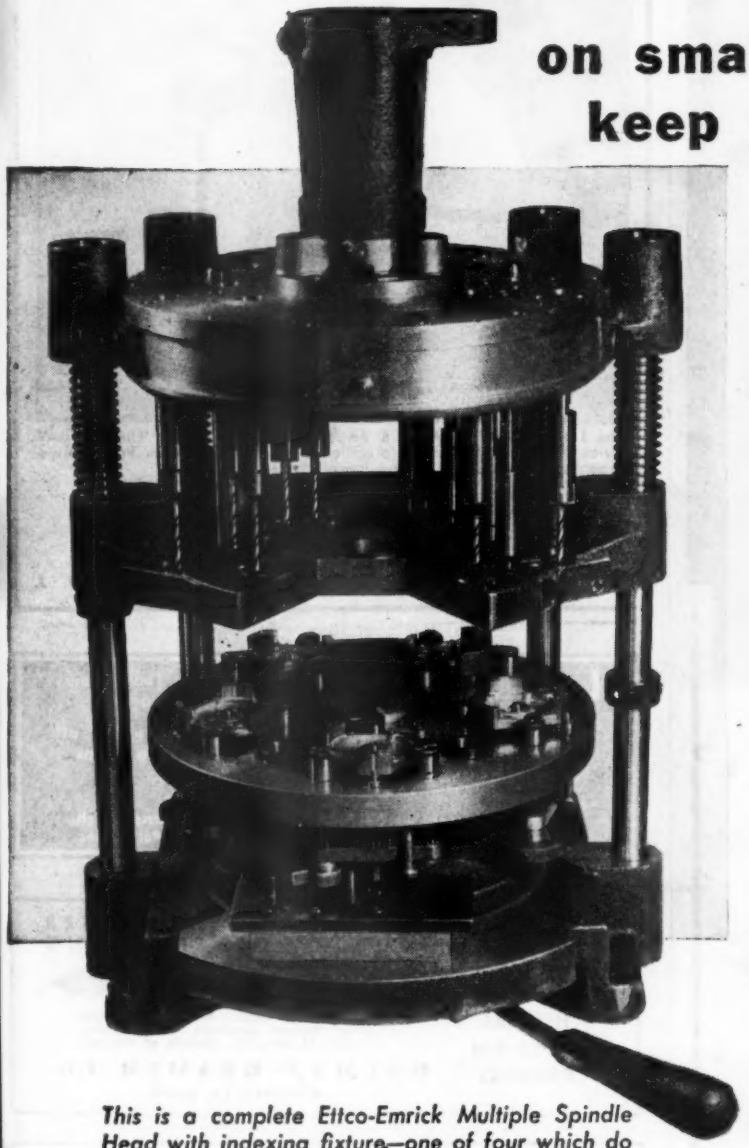
# Drill or Tap 2 to 30 holes at one stroke—

## on small parts—and help keep your prices in line



*This is a complete Ettco-Emrick Multiple Spindle Head with indexing fixture—one of four which do 18 drilling, 27 countersinking, 3 counterboring and 12 tapping operations in 90 seconds. Note that the Head and fixture are all tied together like a punch and die. This fixture is one of a dozen different standardized handling methods that make fast production possible on a wide range of parts.*

**Ettco-Emrick** during the war, tooled up thousands of small intricate parts such as fuses, instruments, electrical parts, etc., for multiple drilling and tapping with Ettco-Emrick Multiple Spindle Heads which increased production all the way up to 500% and more.

We have engineered and supplied Ettco-Emrick Multiple Heads for most of the large manufacturers in the country.

With this really vast experience to apply to your work, we are in a position to tool you up for drilling and tapping your small peacetime parts at rates you may think are impossible.

Whether the parts have 2 holes or 150, we'll engineer and build Multiple Heads for you that will give you any production you need and cut your drilling and tapping costs to the bone.

And these Heads will actually cost you nothing because their savings will pay back their purchase price in quick time.

Send us a drawing or sample part with required production figures for recommendations.

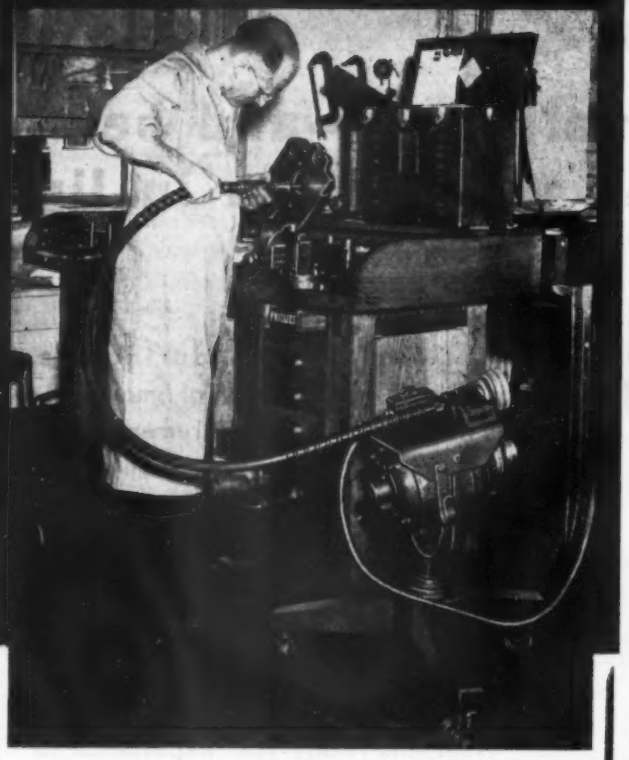
# ETTCO TOOL CO.

**590 Johnson Ave., Brooklyn 6, N. Y.**

*Detroit 1* *Chicago 6*

*Over 25 years specialization in solving Industry's drilling and tapping problems*

# *Indispensable* to Efficient Bench Work



**Cutting and finishing accelerated! Rotary files, grinding wheels and cones, drills and other chuck—adapted tools quickly interchangeable.**

Size range from light flexible drives for intricate die finishing to heavy torque drives.

Work operations are always visible, and the versatile range of Stow Flexible Shaft, using straight spindle or 90° angle head, enable user to reach places inaccessible to power units and hand tools with integrally chucked tools.

*And remember,* in any Mobile Power Unit, it's the *Flexible Shaft* that counts most. Stow units stand up —because Stow invented the flexible shaft.

***Write for Catalog 40C.***

STOW MANUFACTURING CO.
29 Shear St., Binghamton, N. Y.

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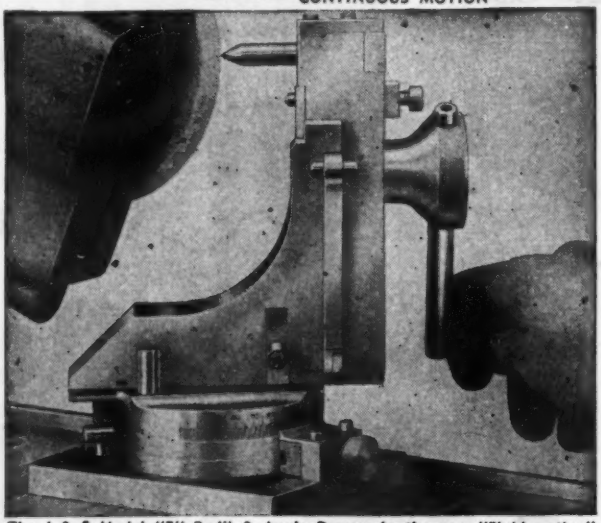
USE *Fluid-motion* for modern form-dressing

ONE SETTING HANDLE CONTINUOUS MOTION



The J & S Model "E" Radii & Angle Dresser in the new "Fluid-motion" series is one of the finest precision dressing instruments procurable—regardless of cost.

FEATURES

Fluid-motion dressing.
.0001" accuracy.
Automatic centering.
Chatterless and dustproof.
14" wheel capacity.
Versatile and adaptable.

J. & S. TOOL CO.
477 MAIN STREET
EAST ORANGE 1, N. J.

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LUERS Patented Cutting Off Tool Holders
Patented Cutting Off Blades

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

Manufactured By
J. Milton Luers — 12 Pine St. — Mt. Clemens, Mich.
Produced under License Issued by John Milton Luers Patents Inc.

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HOLMAN BETTER, FASTER HOLE FINISHING

HELICAL TAPER PIN REAMERS

Scientifically made of selected steel under modern processes. Long lived, economical, accurate. Details on request.

HOLMAN REAMER CO.
MANCHESTER, CONN.

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"BURROFF"

PAT. NO. 2351578

For fast clean removal of burrs and chamfering holes (inside & outside) of multi-walled parts—where regular solid countersinks will not reach.

CONTACT:
JOHN H. GRAHAM & CO.—105 DUANE ST., N. Y. C.

MADE BY
TOOL IMPROVEMENTS CO. — SEAFORD, NEW YORK

# Jessop

**• FOR TURNING OFF CHIPS THAT WEIGH POUNDS**
**• FOR LIGHTER WORK WHERE CHIPS ARE FLUFF**

## MUSTANG M-2 HIGH SPEED TOOL STEEL

"I stood by a lathe in a railway shop where Jessop Mustang M-2 was being used. This is what I saw: *

"Tools were being used for turning simultaneously two locomotive tires 60" in diameter. Both tires were completed in two cuts, removing 1/8" to 3/8" of metal at each cut, at approximately 30 feet per minute. Operator remarked that average tools required regrinding every two cuts, but Mustang M-2 made five cuts, completing the two tires, and still were not in need of regrinding."

Mustang M-2 is just as efficient on the lighter work in average shop practice as on the extremely heavy work that produced the chip illustrated. Evidence of this is seen in the fact that a majority of automobile manufacturers have standardized on this analysis and find it most suitable for 70% of their high speed tool steel requirements.

*Write for complete information.*

*Report from Jessop Field Engineer.

**JESSOP STEEL COMPANY**

HEAD OFFICE AND WORKS **WASHINGTON,** Penna.

Established 1901

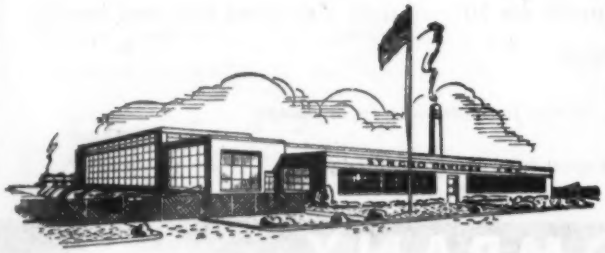
# Consult

# SYNCRO

## the HOME of Precision and Production

SYNCRO specializes in the manufacture of precision machined products and in the solution of unusual engineering and production problems. The skill and experience of SYNCRO craftsmen is at your service—now and after Victory.

**SYNCRO DEVICES, INC.**
**Ferndale 20, Michigan**



1905 **Strand** 1945

**FLEXIBLE SHAFT MACHINES**

**VERTICAL AND HORIZONTAL TYPES**
**⅛ to 3 H.P.**

Swivel Yoke Types
¼ to 1½ H.P.

ONE HUNDRED TWENTY-FIVE TYPES and SIZES

Small Bench Types
⅛ to ¼ H.P.

HIGHEST QUALITY MACHINES
HIGH SPEED STEEL ROTARY FILES . . . ROTARY CUTTERS

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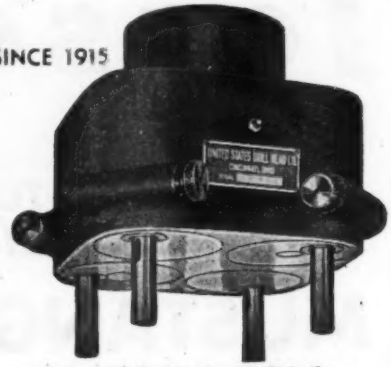
*Largest Flexible Shaft Line in the World*

**N. A. STRAND CO.**
**CHICAGO 40, ILL.** **5001 NO. WOLCOTT AVE.**

**STANDARD US HEADS** SINCE 1915

*All Types of Fixed Center*

**DRILLING TAPPING & BORING HEADS**

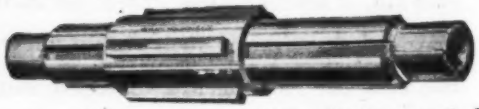


*Four Spindle Head. All Spindles Adjustable for equally spaced holes.*

FIVE TYPES, 56 SIZES, ADJUSTABLE DRILL HEADS
**UNITED STATES DRILL HEAD CO., CINCINNATI 4, OHIO**

**19** ★ ★ **NICHOLSON** ★ ★ ★
***E-X-P-A-N-D-I-N-G MANDRELS*** ★
**Do the Work of 209 Solid Arbors** ★

That's one of the reasons why they're as well known for cutting costs as for promoting precision. Hardened tool steel. Two types, all sizes. Sold singly or in sets. Prompt delivery. Bulletin 1043.

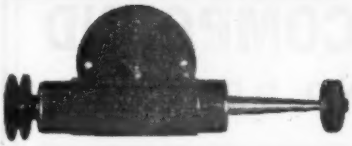


*Other Products: Steam Traps, Control Valves, Arbor Presses, etc.*

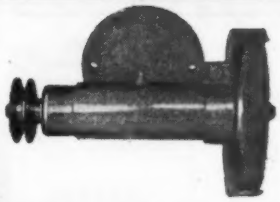
**W. H. NICHOLSON & CO., 114 Oregon St., Wilkes-Barre, Pa.**

# MASTER LATHE CONVERTER

INTERNAL GRINDER



EXTERNAL GRINDER

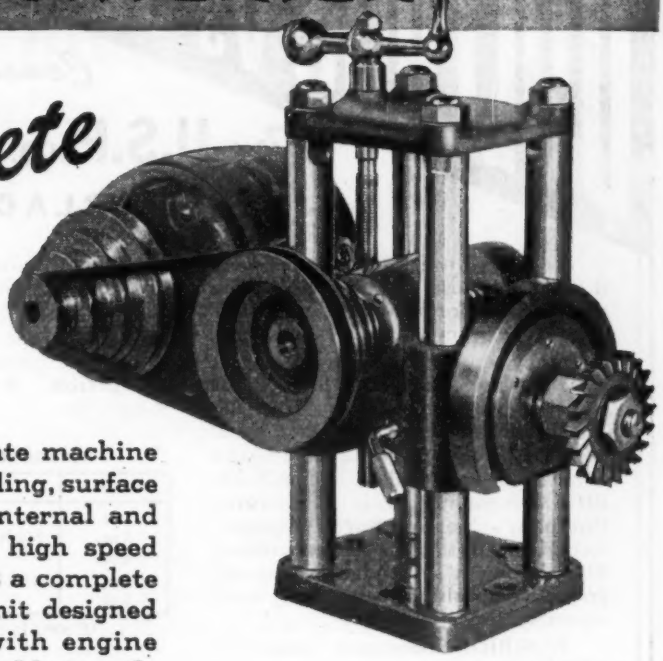


THREAD MILLING

DIVIDING HEADS

THE *Complete*

METAL WORKING MACHINE



**A rugged and accurate machine tool for precision milling, surface and form grinding, internal and external keyseating, high speed drilling, etc. . . It is a complete MOTOR DRIVEN unit designed primarily for use with engine lathes but also adaptable to milling machines, planers, shapers, etc., as a vertical head.**

**Built in 3 Sizes for Lathes from 9" to 36" swing**

## THE SHAPE OF THINGS TO COME

### PRODUCED WITH THE MASTER LATHE CONVERTER

**This versatile machine produces replacement parts, tools and gauges on your lathe. Its compact design and universal adaptability provide the answer to many maintenance and production problems. Why not investigate what this remarkable machine will do for you.**

ARMY E NAVY

**Catalog No. 10 Includes Operation and Maintenance Manual—ASK FOR IT!**

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MM LATHE CONVERTER

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# DOLLARS vs SENSE

## CUT THE COST OF LAPPING HARD METALS

*Cemented Carbides, Tungsten and Others*

## Try U.S.P.co. NORBIDE COMPOUND

### IN PLACE OF DIAMOND DUST

The war is over! Selling prices are still frozen! Costs are up! Now, more than ever before manufacturing profits must come from operating economies.

Many who are lapping hard metals with expensive diamond dust will be surprised at the economy, speed and efficiency with which NORBIDE Compound will accomplish the same results at much lower overall cost. For NORBIDE Compound is made using Norton Company's Norton Boron Carbide, second only to the diamond in hardness. This abrasive is suspended in a special grease composition paste base made especially for lapping.

NORBIDE Compounds come ready mixed—ready to use. They are made in all standard grit sizes. For ripping or roughing, grit size No. 240-N is recommended. No. 320-N or 400-N are for semi-finishing operations. Where extremely fine finish is desired, use either No. 600-N or No. 800-N.

Try NORBIDE Compound on your own operations. Prove its speed, efficiency and economy without cost or obligation. Write for one ounce sample jar.

**NORBIDE COMPOUND PRICES**

| Size Jar | Grit Size | Price |
|---|---|---|
| 1 oz. | All grades | $2.00 ea. |
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| 8 oz. | 320-N | 4.50 ea. |
| 8 oz. | 500-N and 600-N | 6.00 ea. |
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(Prices: F. O. B. Pittsburgh, Pa.)

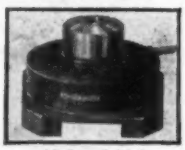
*Try it* **FREE!** One oz. sample jar sent postpaid. *Specify grit size wanted.* See table below.

*U. S. P. Co. NORBIDE Compound is made using NORBIDE abrasive shown below.*

UNITED STATES PRODUCTS CO.
518 MELWOOD ST PITTSBURGH, PENNA.



# MEAD AIR COLLET FIXTURES



LS-1 and LS-2

LS-3 and LS-4

Pygmy Collet

JC-2 holds bar stock up to 2½" and with step chucks handles shallow circular shapes to 5". Used wet or dry. Collant issuing through the collet lubricates, cools, washes away chips. The smaller models hold stock for heavy machinery operations, yet with a suitable pressure reducer, they will gently handle the most delicate precision parts as low as 1/16" diameter. Work automatically elected. Foot pedal frees operator's hands. These high production precision fixtures will help you produce more second operation work quicker, cheaper, better.

*Write for complete MEAD AIR POWER CATALOG of pneumatic workholding equipment.*

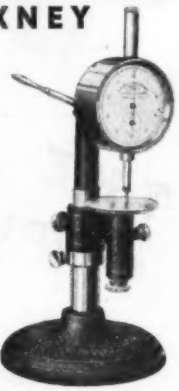
## MEAD SPECIALTIES COMPANY

*4114 North Knox Avenue* *Dept. MA-105, Chicago 41, Illinois*



## RANDALL & STICKNEY

*Universal Gauge*



*for rigid inspection of a wide range of parts . . .*

An almost unlimited use is offered by this instrument for inspecting duplicate parts in quantity or any small parts with flat surfaces or recesses.

Use of standard blocks made possible by raising or lowering table increases capacity to take material up to 2" in height. Graduated to read to .001 inch; height 9¾"; weight 5 lbs. 1¼ oz.; depth from frame to spindle 1⅜".

*Full details on request*

Can be supplied with sliding head and table; also on a stand with throat 3" deep.

**RANDALL & STICKNEY**
*Makers* *Waltham 54, Mass.*



## DON'T GUESS! TEST R.P.M.

**With a MODEL "J" HAND TACHOMETER**

Triple Range:
300— 1200 R.P.M.
1000— 4000 R.P.M.
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*RUGGED-RELIABLE-CONTINUOUSLY INDICATING TYPE*

*WRITE FOR BULLETIN #706*

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27 PARK PLACE NEW YORK, N. Y.

NORTON ABRASIVES

# Horse-sense Method *for the* New Tool-up

**SAVE MONEY and time NOW, by changing over your grinding and finishing on set-up wheels to the very latest practice—METALITE CLOTH BELTS with IDLER BACKSTANDS.**

It's easy to install an Idler Backstand behind your present lathe or polishing jack. Then slip an abrasive cloth belt over the resilient contact wheel to connect the two. Instantly you have new equipment with all these obvious benefits:

- √ Greater output
- √ Faster, cooler cut
- √ Better finish
- √ Lower cost

The technically controlled sharp surface of METALITE CLOTH BELTS available in 17 grit sizes, uniform from lot to lot, insures fastest possible cutting action.

The belt disperses heat much more effectively than a set-up wheel because of greater area—three times that of the average wheel face.

Both these features, plus time saved in making grit changes, result in better finish at lower cost.

• • •

For authentic records of increased performance, as much as 17 to 1; photographs of many and varied installations; names of Backstand manufacturers, and other helpful data, ask for new 8-page folder, "Plus Factors in Belt Grinding and Finishing with Idler Backstands." Use the coupon; you'll be well repaid.

**BEHR-MANNING**
(DIVISION OF NORTON COMPANY)
**TROY, N. Y.**
*Quality Coated Abrasives Since 1872*

BEHR-MANNING, TROY, N. Y.

Please send your new, 8-page "Plus Factors" folder on Idler Backstands.

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☐ Please have Field Engineer call.

# MAKE FIXTURES, DIES, JIGS *Quickly-Easily*

COSTS *PENNIES . .*

SAVES DOLLARS *per square inch!*

HIGH RED HARDNESS!

REQUIRES NO HEAT TREATING

## FANWELD

**THE MIRACLE HARD FACING METAL**

FANWELD is the new hard facing metal easily applied by acetylene torch. It imparts a durable, wear resistant surface that remains hard even under red heat. It is unsurpassed for facing worn dies and other parts.

FANWELD is used more and more for quickly improvising jigs, fixtures, dies, cams and other parts which must resist wear. With medium carbon steel and a few FANWELD rods, a new part is a simple matter of a few hours. No heat treating is necessary. Expensive, hard-to-machine alloys are entirely eliminated.

FANWELD contains Tantalum/Columbium Carbide, which imparts a peculiar lubricating action greatly increasing resistance to wear. FANWELD can be applied evenly and smoothly, without holes. Find out how FANWELD can help in your tool room. Ask for Bulletin F-428.

*Address Fanweld Division*

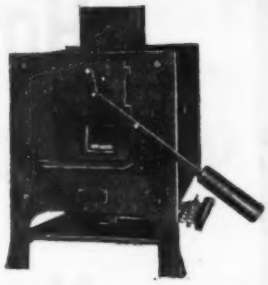
**FANSTEEL METALLURGICAL CORPORATION**

North Chicago, Illinois • Offices in Principal Cities

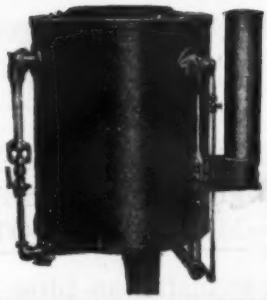
## "BUZZER" HIGH SPEED *Gas* FURNACES

**2400° F.** attained quickly with "BUZZER" High Speed Full Muffle Furnaces.

Designed primarily for high carbon and alloy steels.



NO BLOWER or POWER NECESSARY ... just connect to gas supply



**"BUZZER" Atmospheric Pot Hardening Furnaces assure even heat up to 1650° F.**

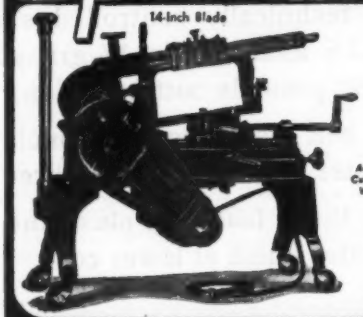
Used for Salt, Cyanide and Lead Hardening. Also adapted for Melting Aluminum.

*Send for the complete "BUZZER" catalog today.*

**CHARLES A. HONES, INC.**

121 So. Grand Ave. Baldwin, L. I., N. Y.

## POWER HACK SAW ★




LOW PRICED SELF-CONTAINED

**PORTABLE STURDY**

READY TO WORK ECONOMICAL

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## TORNADO WRITING TOOLS and ETCHERS

TORNADO Electric Writing Tool. Used for marking everything. Easily portable anywhere.

***Protect Valuable Tools!***

TORNADO Electric Writing Tools and Etchers mark everything of value that might be lost, misplaced or stolen. TORNADO Writing Tool marks brass, marble, tile, glass, plastics, wood, hard rubber, aluminum, steel and bronze.

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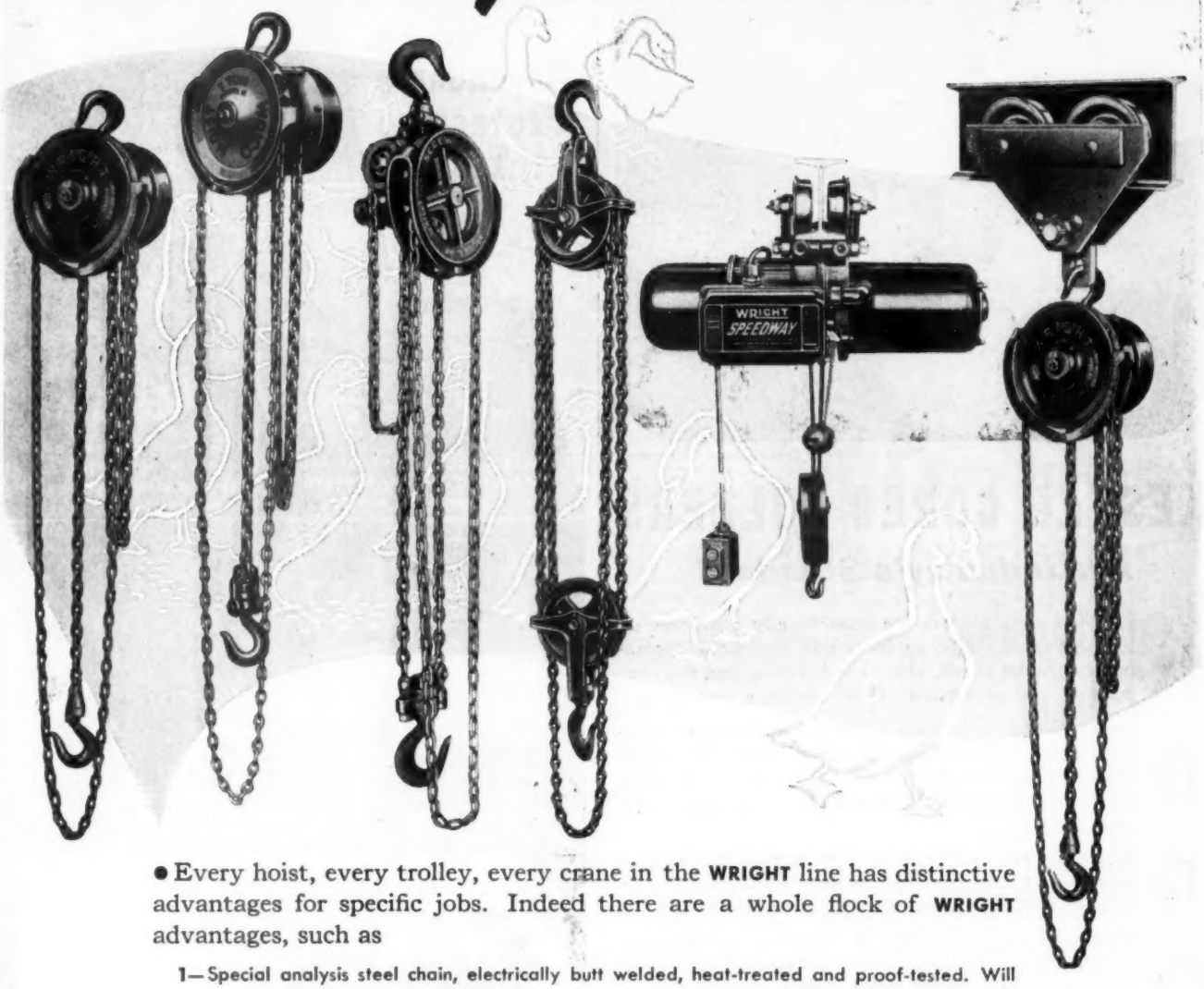
# THE WRIGHT LINE

## HAS A WHOLE *Flock* OF ADVANTAGES!




• Every hoist, every trolley, every crane in the **WRIGHT** line has distinctive advantages for specific jobs. Indeed there are a whole flock of **WRIGHT** advantages, such as

1—Special analysis steel chain, electrically butt welded, heat-treated and proof-tested. Will not work harden.
2—Each link is gauged to fit pocket wheel. The chain is exceptionally high in tensile strength.
3—Non-fouling chain guide permits pulling of hand chain from any angle below hoist.
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5—Drop forged bottom hook from special analysis steel gives visible warning when overloaded through slowly opening without fracture, thus providing safe operation.
6—Precision ball bearings to increase efficiency and ease of operation.

Another **WRIGHT** advantage is engineering based on three principles: Safety, Efficiency and Economy. See your local **WRIGHT** distributor.

ARMY (E) NAVY

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**WRIGHT MANUFACTURING DIVISION**
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ACCO TRADE MARK

*In Business for Your Safety*

# 4 reasons why

Photo courtesy of Crosley Radio Corporation

## KESTER CORED SOLDERS

### *Are Industry's Standard*

1. Kester Cored Solders are scientifically compounded to form clean, tight solder-bonds that hold *permanently* against shock, vibration, bending, and the contraction and expansion of temperature extremes.

2. Kester Cored Solders are applied in one simple operation. Virtually mistake-proof and trouble-free because the flux-filled core is perfectly balanced with superior alloys—and in the right combinations for every type of soldering.

3. Kester Cored Solders are of the highest quality and unvarying uniformity—the result of Kester's 46 years of practical experience and intensive research.

4. *Kester Rosin-Core Solder*, for electrical connections, and *Kester Acid-Core Solder*, for general work, are both available in a wide range of strand and core sizes. The correct solder, always, for any soldering job.

Feel free to call on Kester engineers at any time for help in solving your solder problems. There is no obligation!

☆ BUY WAR BONDS ☆

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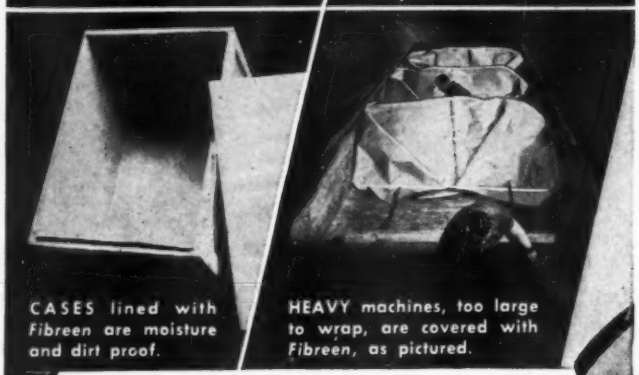
## for Dependable Protection in Transit

MACHINES shipped in open cars or stored in the open, are protected from the elements with *Fibreen*.

BALES or bundles of all shapes and sizes are wrapped with *Fibreen*. It's pliable.

CRATES, with engines, paper, or machine tools wrapped in *Fibreen*, give dependable, low cost protection.



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HEAVY machines, too large to wrap, are covered with *Fibreen*, as pictured.

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Send for a "working" sample of *Fibreen*. See how tough it is. Keep a few rolls in your shipping room.

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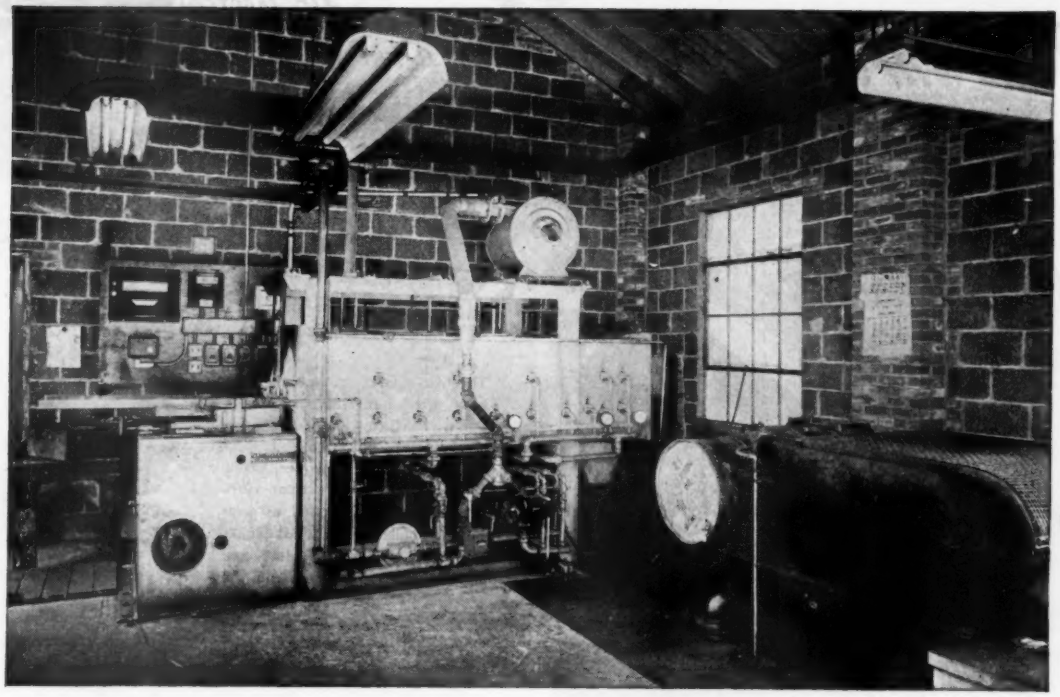

# *Versatility*

## SCREW DRIVERS AND CHISELS
## SHEET METAL FASTENERS
## MISCELLANEOUS HARDWARE

### HARDENED IN ONE MACHINE AT CORNWALL & PATTERSON CO.

THIS TRIM INSTALLATION, consisting of an AGF Full-Muffle Reciprocating Heating Machine and Automatic Quenching Tank, replaced five salt baths at Cornwall & Patterson Co., Bridgeport, Conn.

BY USING GAS as the protective atmosphere, messy washing of salt from the treated work was entirely eliminated, and final tumbling time on some parts reduced from two hours to 25 minutes.

MINIMUM FLOOR SPACE was required by the "corner" installation, in which the heating machine and quenching tank are placed at right angles. Blower is mounted directly on the furnace frame.

FUEL COSTS were cut by one-third, and handling operations were reduced merely to loading the machine at 20-minute intervals.

250 POUNDS PER HOUR is the rate of production on screw driver blades. Blades being handled range from 1/16" dia. x 3" long to 5/16" dia. x 12" long. Identical machines in other plants are handling work ranging from steel writing pen points to bolts 2" dia. x 10" long.

RECIPROCATING HEATING MACHINES are made in five different sizes, with capacities ranging from 10 to 1200 pounds of work per hour. Write for further information on these machines and other types of heat-treating equipment.

**AMERICAN GAS FURNACE CO.**

**ELIZABETH, NEW JERSEY.**

## Saves $540 A YEAR... Runs Only 1 to 2 Loads a Day!

A Detroit tool manufacturer* has only enough metal chips for one or two loads a day in their AMERICAN Chip Wringer, or less than 5% of the machine's capacity. Yet, according to the plant's actual figures, their Chip Wringer saved them $852.72 in 19 months. "At this rate," the Vice-President of this concern writes, "the machine will have paid for itself in 22 months, and after that, will earn us in excess of $45 per month, every month." *($540 a year!)*

The AMERICAN Chip Wringer reclaims more than 90% of the cutting oil from a load of metal chips and machine turnings *in less than 3 minutes* running time. Any unskilled person can operate it. If you use as little as 10 gallons of cutting oil a day, it will pay you to find out how much money and valuable oil an AMERICAN Chip Wringer will save you. No obligation. Write TODAY!

Free
ILLUSTRATED CATALOGS
Send for these booklets describing five models of AMERICAN Chip Wringer.

*Name on Request.

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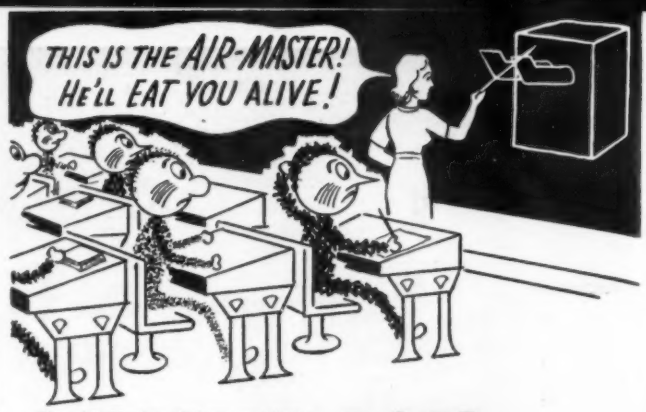
CINCINNATI PLANT

THE AMERICAN LAUNDRY MACHINERY CO.

The AMERICAN LAUNDRY MACHINERY COMPANY
CINCINNATI 12, OHIO




The Air-Master thrives on dust and grit, but your employees don't. Neither do sensitive parts of valuable machinery. Protect them from these tiny but harmful agents of destruction. Have the Air-Master installed at your buffers and grinders. It sucks up every tiny bit of dust and grit the moment they fly from the whirling wheels. Prevents them from getting into the air your employees breathe. Keeps them out of delicate mechanisms.

The Air-Master is fully self-contained—efficient, rugged, dependable. A size for every grinder and buffer. Write today for full details.

NOW AVAILABLE — Two, Three and Five H.P. grinders and buffers.

The Cincinnati
ELECTRIC DRILLS • GRINDERS • BUFFERS • PORTABLE TOOLS
The Cincinnati Electrical Tool Co.
DIVISION OF THE R. K. LE BLOND MACHINE TOOL CO., CINCINNATI, OHIO
2615-21 Madison Rd.

# FASTER HAND OR PRESS STAMPING

12 characters, more or less, stamped at one blow. Press the thumb clip and quickly change type or dies for next markings. No weakening groove in type. Heavy Duty Type with "Extra Strength Shoulder" stamps any untempered steel, or other material. Ask for HERCULES HOLDER & TYPE.

Write for literature and price lists.

THE ACROMARK CO.
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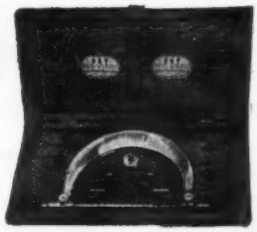
# D&T MICROMETERS AND SNAP GAGES

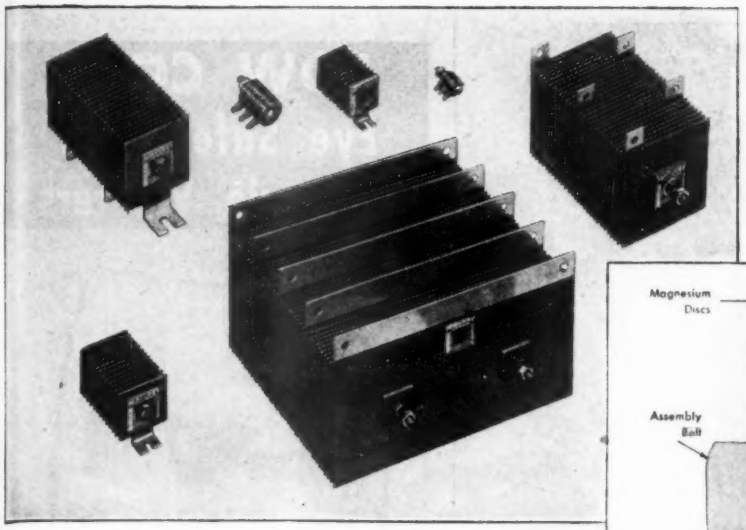
Tubular welded frames with forged ends insure a maximum of accuracy with a minimum of weight.

There are a variety of types available with either micrometer heads or dial indicators to cover a range of capacities from 0 to 168 in. . . *Write for Bulletin 200* or outline your gaging problems.

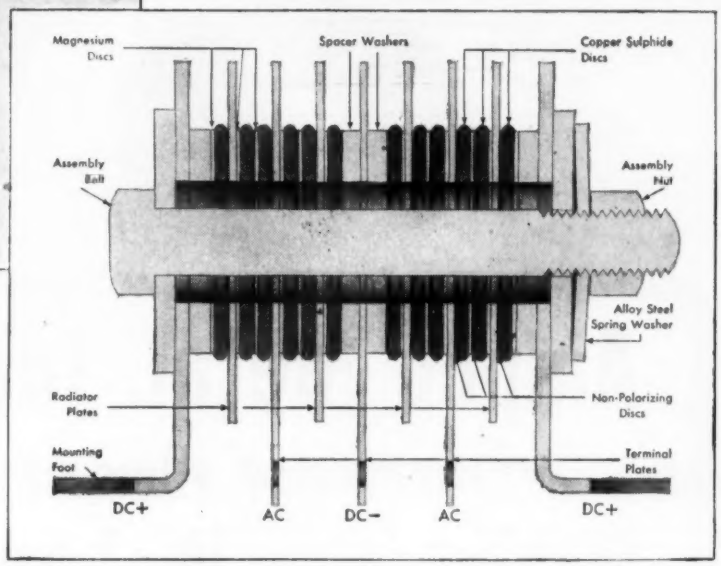


• D & T Bow Micrometer 0 to 6 in. capacity

Davis and Thompson Co.
Mfrs. of Machine Tools and Micrometers
6411 W. Burnham St. Milwaukee 14, Wisconsin



# Wherever You Need DC from AC

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WHEN you have an AC source and need low voltage DC, the most efficient answer is apt to be a Mallory Dry Disc Rectifier.

Available in a wide range of sizes and ratings, from tiny "button" rectifiers to large heavy-duty stacks, in capacities from 0.3 ampere to 35,000 amperes DC and up, Mallory Rectifiers give years of silent, trouble-free service. Sturdily constructed, completely sealed to resist atmospheric changes, Mallory rectifiers have no moving parts—nothing to break or wear out—require no maintenance expense.

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Experienced Mallory engineers will gladly help you select the best rectifier for any specific application. Write to us or ask your nearest Mallory Distributor for a free copy of Catalog R615A.

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***Battery Chargers for:***

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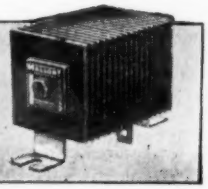
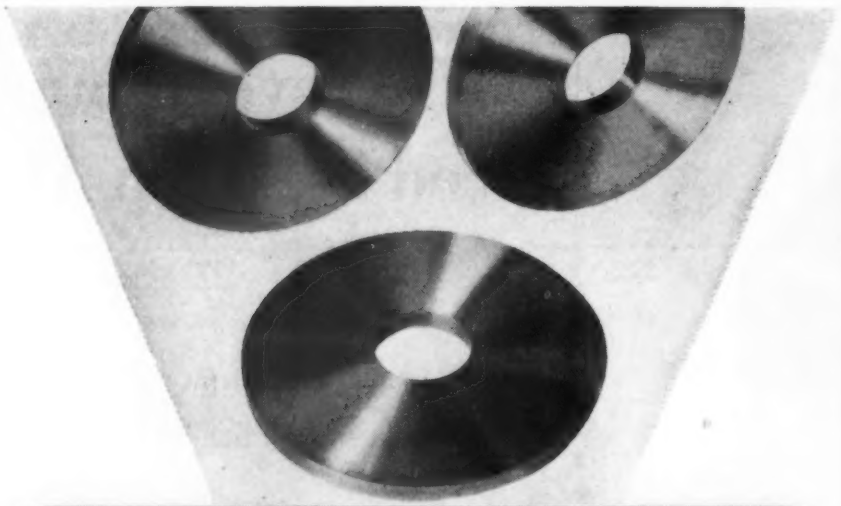
STATIONARY AND PORTABLE D. C. POWER SUPPLIES—
BATTERY CHARGERS AND AVIATION RECTOSTARTERS*





# Ampco Metal, Inc.

## *Announce* a line of

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**Seam Welder Wheels**

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Ampco's wealth of experience in the field of non-ferrous alloys, led to the development of high conductivity alloys used in the Resistance Welding Industry.

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**Ampco Metal, Inc.**
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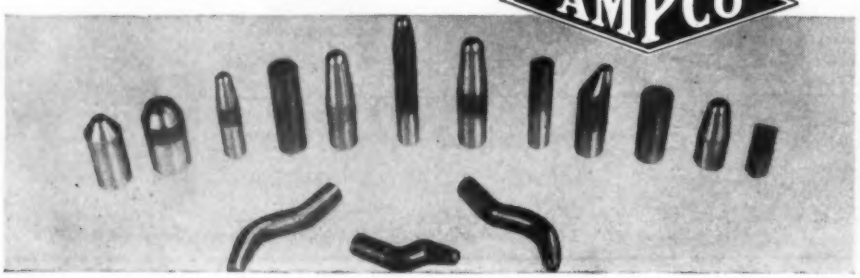
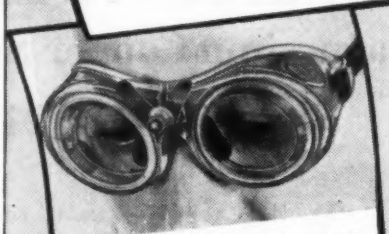
AMPCO RW-1



# LOW COST Eye Safety For Spectacle Wearers

Willson Cover-All* cup goggles give complete protection on eye-hazardous operations. Roomy enough to fit over ordinary correction spectacles.



Direct ventilation prevents lens fogging. Eye cups are transparent for clear side perception. Accurately fitted to facial contours. Leather nose bridge adds extra security.

Designed to withstand impact hazards striking from any angle. Each Super-Tough* lens is given rigid, individual testing. Uniformly heat treated to assure maximum fracture resistance.

For help with your eye-protection problems, get in touch with your Willson distributor or write for further information.

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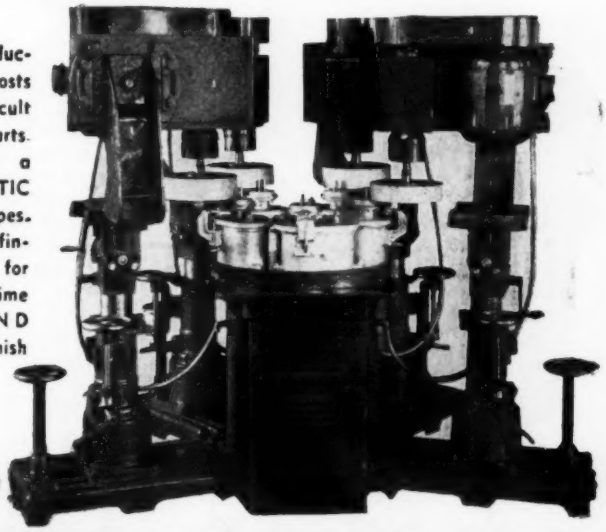
## WOE TO THE WORRY BIRD

When work breeds worry . . . treat the ailment, not the symptom. Reduce work, and worry will vanish AUTOMATICALLY . . . which, incidentally, is an excellent prescription. We have reduced the hand work of polishing and buffing to the vanishing point and, if you're one of those individuals who listen to the worry bird . . . we'd like to tell you about it.

Speed-up Production. Lower costs on your difficult to finish parts. There's a PACKER-MATIC for all shapes, metals and finishes. WRITE for Factory Time Study — SEND Part and finish desired.



*No. 4-5 Indexing Type With Oscillating Wheel Heads*

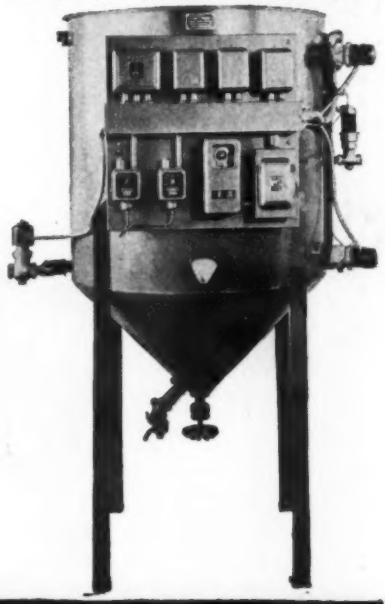
# *Packer-Matic*

THE PACKER MACHINE CO., MERIDEN, CONN., U. S. A.

# PREVENT CONTAMINATION – EXTEND TOOL LIFE

## with the NEW BARRETT COMBINATION STERILIZER AND SEDIMENTOR for CUTTING OILS . . . .

Barrett Sterilizer and Sediment Precipitator arranged for fully automatic operation.



**Protects your operators against infection—insures more and better work from your cutting tools—by sterilizing your cutting oils and precipitating sediment *at the same time.***

The NEW BARRETT STERILIZER AND PRECIPITATOR combines these two operations in one piece of apparatus which can be depended on to handle both operations effectively, efficiently and economically. Sterilization is by heat and is a positive active operation in the line ahead of the supply tank. By locating in this position, contamination is intercepted before the cutting oil is conditioned for safe, bacteria-free reuse.

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By thoroughly and constantly sterilizing and effectively removing solid matter, the Barrett Combination Sterilizer and Sedimentor reconditions cutting oil for reuse; sterilized for safety's sake and abrasive-free for longer tool life.

### GET COMPLETE INFORMATION NOW

***These units are available for floor, wall and post mounting and are furnished with semi-automatic or full automatic control as required. Send at once for detailed information on this timely Barrett development.***

## THE LEON J. BARRETT CO., WORCESTER, MASS.

*Designers and Builders of Centrifugal Machinery*

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Cross section of Tru-Grip Tap Holder showing positive drive to tap.

# *For* Light Drill Presses

## A MORE EFFICIENT TAPPING HEAD!

This special cover clamping model Procunier Tapping Head has been developed for most light drill presses. Removes weight of tapping head from bearings and drill press spindle. Rigid and accurate mounting is secured with fittings which clamp directly around the press quill. Other advantages include no overhang, no tap wobble, longer tap life, less tap breakage, and greater accuracy. Easily attached and removed. Thousands of shops report unusual production records with Procunier because these remarkable heads are built to stand up under the toughest production grind. The exclusive advanced design of the new Procunier Tapping Heads assures you accurate tapping at high speeds with automatic protection for taps! Tap is driven by a double-cone, cork-faced friction clutch which automatically regulates tap driving power by pressure applied through the drill press spindle. Operators can quickly detect full or loaded taps by the "feel," or pressure on the clutch, required to drive them, thus avoiding needless tap breakage. With this sensitive Procunier smooth operating friction clutch, bottom tapping is as simple as through tapping, since the clutch instantly slips should the tap strike bottom or stick due to tap loading.

### SEND FOR BULLETIN

giving full details, description and prices on complete line of Procunier Precision Tapping Heads to meet all needs. The new Tru-Grip Tap Holder —and also the full line of Procunier Universal Tapping Machines.

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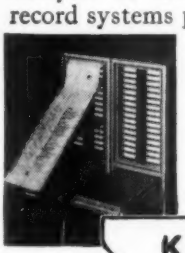
What is unusual about this man?

It's his ability to inject the priceless element of *control* into your business records . . . to give them "Fact-Power."

Without control, records are a mere history of stock . . . cost . . . personnel . . . sales. Such records *fail to indicate in themselves what action should be taken, and when.* Minor and major decisions alike must wait upon analysis of recorded facts, unless record systems provide *control.*



Sight analysis, made possible by the development of Kardex Graph-A-Matic charting signal control, is saving thousands of man-hours every day because somebody called in the *Systems Technician.* While providing the all-important control, this man also knows how to simplify and consolidate duplicated and overlapping records. He can design them to eliminate waste effort, house them for faster, easier reference, protect them from fire at the point of use.

Through knowledge interchanged with his hundreds of colleagues, he can bring you the accumulated record-control experience of leading railroads everywhere. He is at our nearest Branch Office, and can go to work for you today.

**KARDEX IS 1**

. . . 1 among many methods and types of equipment from which the Systems Technician selects and combines those best suited to individual needs.

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MALLORY

**P. R. MALLORY & CO., INC. wanted speedy terminations.** The Systems Technician recommended a *Kardex* contract termination record with follow-up control to eliminate needless delays, protect assets and obtain prompt settlements. Steps are checked on visible margin as accomplished, thus showing exact status and controlling procedure *visibly* at all times. Two-drawer *Safe-Files* protect all supporting papers against fire loss, and serve as a base for the Kardex Cabinets. No lost time, no costly confusion with this compact system! We'll gladly furnish details.

FEDERAL

**FEDERAL MOTOR TRUCK CO. wanted faster pricing.** Also desired was ability to add new items and make price and other changes without breaking sequence of record. Recommended by Systems Technician, *Speed-A-Matic "Chaindex"* met all requirements with a compact, *visibly* indexed pricing list on which any part number, name and price are seen in a glance. Individual item cards are easily removed, added or changed. Operating speed is double — Federal's pricing is now done by one girl instead of two. Ten days — 400 labor hours — were recently saved in pricing annual inventory.

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**SPICER MFG. CORP. wanted improved stock control.** Like other leading manufacturers, Spicer has avoided production delays and cut down "rush" orders with *Kardex* and the sensational new *Graph-A-Matic "Self-Computing" Signal Control.* Actual numerical balances show clearly in a visible "chart." Status of each item is indicated in terms of overstocked, re-order point and follow-up without need of computation or analysis. This tremendous advance in record-keeping simplicity, speed and value is fully detailed in Management Controller No. 708. ASK FOR IT TODAY.

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**315 Fourth Avenue, New York 10, N.Y.**

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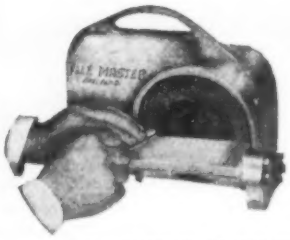

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*Write for illustrated bulletin.*
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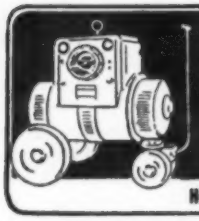

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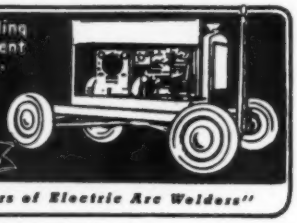

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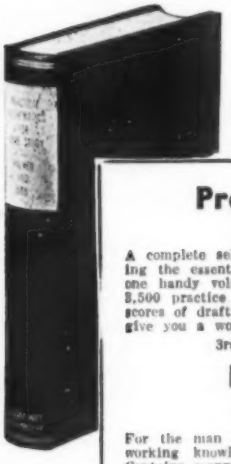

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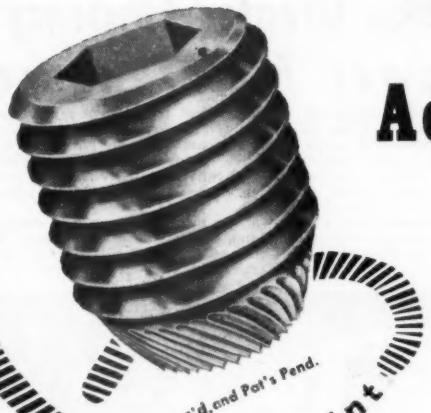


on the point

on the head

Knurling of Socket Screws originated with "Unbrako" years ago.

### "UNBRAKO"
**Knurled Point Self Locking Socket Set Screw**

It can't and won't be shaken loose! The knurling of the cup point provides sharp ridges and points which, when the screw is tightened as usual, dig in firmly and hold tight, despite all vibration. Even so, it can be easily removed with a wrench, and used over and over again.

UNBRAKO
Reg. U. S. Pat. Off.

### "UNBRAKO"
**Knurled Socket Head Cap Screw**

The knurled head of this screw affords therefore a "slip-proof", time-saving grip for the fingers. That means the "Unbrako" can be screwed-in farther and faster, before using a wrench. Where small screws are needed, the knurled head is especially helpful—saves oodles of lost motion.

Both of these "Unbrako" screws are available in sizes from #4 to 1½" diameter—full range of lengths.

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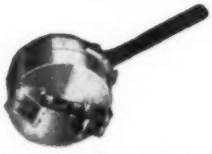


*Barker Wrenchless Two-Jaw Chuck*

*Barker Wrenchless Three-Jaw Chuck*

The experience of this user is typical of the reports from hundreds of manufacturers who are operating Barker Wrenchless Chucks—substantial dividends in more parts per hour, and lower cost per part.

You, too, can have these vital advantages. Write today for full information!

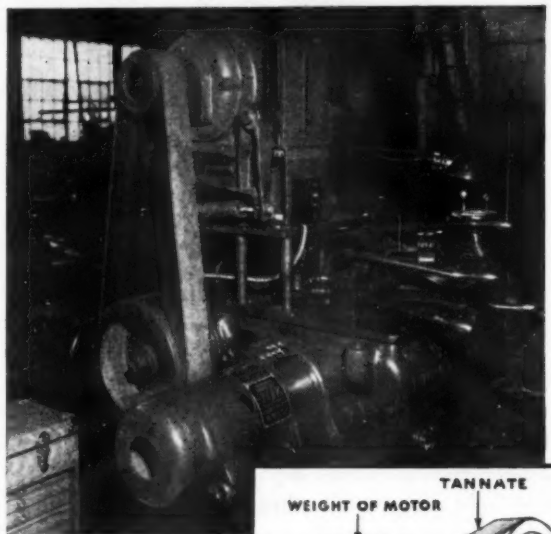
**THOMAS HOIST CO.**
*Chuck Division*
20 South Hoyne Avenue, Chicago 12, Illinois

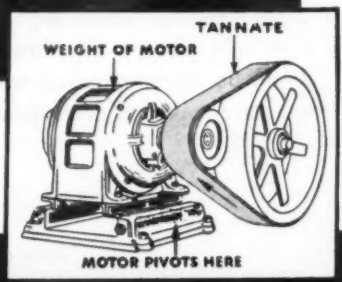
## Why the *Automatically* CONTROLLED Belt Tension of the TANNATE-ROCKWOOD Drive provides *Greater Efficiency . . . Lower Maintenance!*

The Tannate-Rockwood Drive provides a simple means of maintaining correct belt tension. Too little tension permits a belt to slip . . . wastes power—too much tension causes wear on both belt and bearings. The Tannate-Rockwood Drive avoids both of these conditions by assuring correct tension automatically . . . by the weight of the motor on the pivoted Rockwood base. It is carefully designed to do just that.

The Tannate Belt, because of its great strength and flexibility and unusual endurance keeps maintenance costs down . . . assures long life.

Get a Tannate-Rockwood Drive for floor, wall, ceiling, or vertical drives using small or large motors. Get more details now.






*A vertical base type Tannate Rockwood drive operating a lathe in a metal working plant.*

**RHOADS** *Tannate-Rockwood* **SHORT CENTER DRIVE**

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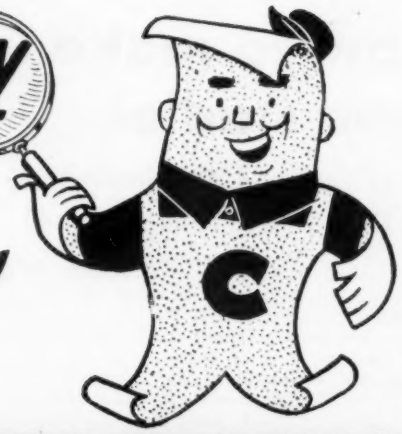
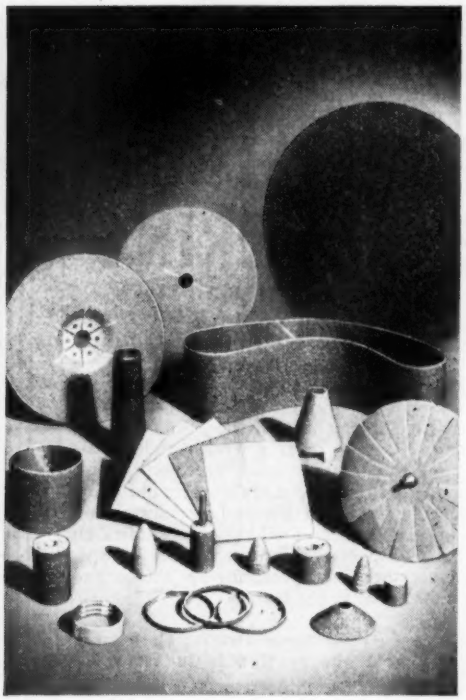
# NOW IT'S EASY TO IDENTIFY COATED ABRASIVES BY "CARBORUNDUM"





"CARBORUNDUM" has put its simplified identification system for coated abrasives into effect. Now it is easy to order these products. First the product is called by its right name—the name of the end use. Second that name and the specifications appear on *both* the package label and the backing material. The man in the shop can easily tell what he is using and requisition more. The stockroom finds it quicker and easier to locate the requisitioned material. The purchasing department eliminates trouble in duplicating previous orders. For complete information, please refer to our new, authoritative coated abrasives book, "Sanding & Finishing." If you have not yet received your free copy, please write The Carborundum Company, Niagara Falls, New York.

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# How to make time studies

## described and demonstrated in this practical manual

Here at last is a course in time study for those who do not have extended technical, mathematical, or industrial training. It starts at the very beginning and covers completely both the methods of time study and the background of machines and operations of industry the time study man must understand, in a practical, home-study treatment. The author of the book says, "Anyone who can rate 90% in answering these questions (appearing at the end of each chapter) would be able to take and hold a time study position in any industry."

# TIME STUDY ENGINEERING

**By WILLIAM H. SCHUTT**

*William H. Schutt Associates, Detroit*

***130 pages, 6 x 9, 124 illustrations, $5.00***

The book shows the whys and wherefores of time study work, reviews the arithmetic needed, tells step by step how to carry out a time study and gives a wealth of information on the machines and processes of industry, what the time study man should know about their construction and operation, and the special factors of taking time studies on each. Twenty-eight specimen studies on specific machines and operations are shown and fully discussed in the text.

- **gives 26 time-study charts; each from an actual observation in industry.**
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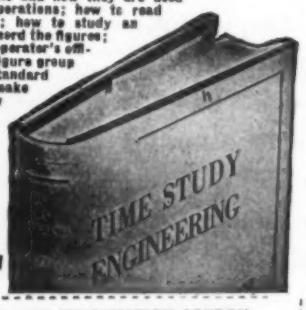
- **emphasizes factors of economical production and fair standards for the worker.**

**Covers:** Fundamentals of time study, requirements of work, equipment and how it is used, etc.: the basic motions and how they are used in analyzing operations; how to read the stop watch; how to study an operation and record the figures; how to rate the operator's efficiency; how to figure group bonus and standard hours; how to make process or flow charts, etc.

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**McGRAW-HILL EXAMINATION COUPON**

McGraw-Hill Book Co., 330 W. 42 St., N. Y. C. 18

Send me Schutt's TIME STUDY ENGINEERING for 10 days' examination on approval. In 10 days I will send $5.00, plus few cents postage, or return book, postpaid. (Postage paid on cash orders.)

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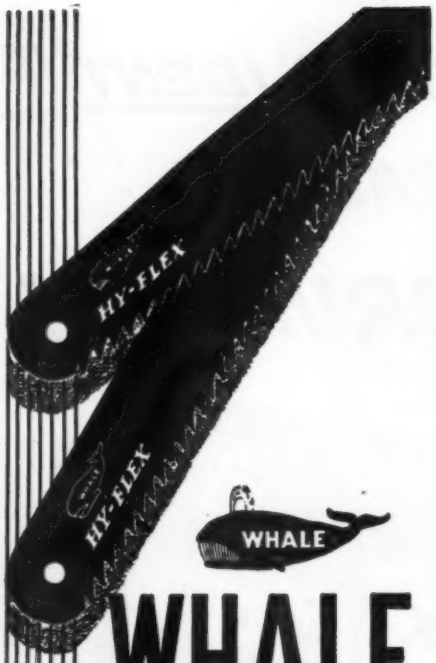


# WHALE BRAND HACK SAW BLADES

Here's the original, time-tested HY-FLEX BLADE . . . scientifically heat treated to add the toughness that gives these blades their outstanding performance. They are gauged and checked throughout every step of their manufacture and given a stiff bending pounds test before you get them for use. HY-FLEX meets today's demand for a medium priced blade which is extremely flexible, yet has the toughness that assures long service life.

Here's a Whale of a Blade of a special analysis molybdenum, high speed steel that gives unusual cutting service. Can be used at the same cutting speeds as tungsten and deliver practically equal performance. If you want outstanding results on stubborn cutting jobs, ask your mill supply house for WHALE BRAND HY-FLEX and MO-HY BLADES and you'll get it.

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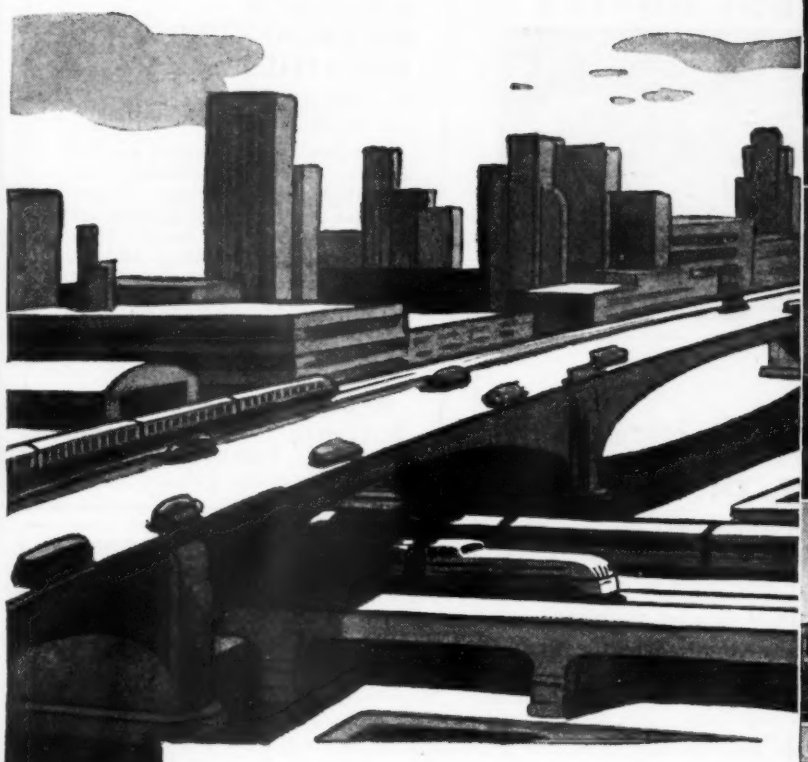

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The steadily increasing demand for Allied's precision workmanship from the very beginning has fostered the enlargement of its working area from 5000 square feet in one plant in 1915, to 275,000 square feet in four great plants today. This growth over a period of 30 years . . . steady and consistent . . . places Allied solidly on the main road of industry . . . establishes Allied as a standard source of precision tools and parts *in great quantity* for automotive, radio, home appliance, plastics, aviation, furniture, electrical, farm implement and many other mass production manufacturers. Send in *your* blueprints . . . or write to Allied, now.

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***"IT'S AN ALLIED PRODUCT."*** In its four plants shown above—two in Detroit and two in Hillsdale, Michigan—Allied makes special cold forged parts, cap screws, etc.; hardened and precision ground parts; sheet metal dies (from the largest to the smallest); R-B Interchangeable Punches and Dies; jigs, fixtures, steam-heated plastic molds and special production tools.

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Department 26
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# CONTRACT WORK

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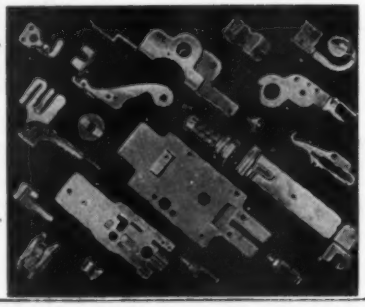
### IN ALL KINDS OF METALS



Fast and efficient service on long or short runs is guaranteed by our modern equipment and methods, backed by 50 years of experience.
We also offer facilities for the manufacture of screw machine products, tools, dies, jigs and fixtures.
Quality work by skilled mechanics is assured. Send your blueprints or samples today.

*"GREATER SAVINGS WITH GREIST"*

**THE GREIST MFG. CO.**
546 BLAKE ST. NEW HAVEN, CONN.

## ● Machines and Parts,
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Your engineering problems will receive efficient and economical service in our modern plant manned with skilled workers. Contact us today for prompt quotations on your blueprints or samples.

***Designers and builders of wire and ribbon stock forming machines.***

**THE A. H. NILSON MACHINE COMPANY, BRIDGEPORT, CONN.**

## SPECIALTIES — PRECISION WORK

Available capacity for automatic screw machine products up to 1⅝" diameter.

Equipped for secondary operations: Thread rolling and chasing, centerless grinding, drilling, heat treating, and plating.

Forward blueprints for quotations. Prompt-efficient service.

**JOHN L. BUXTON CO.**
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**WANTED—WORK (PEACETIME)**
**ON CONTRACT BASIS**
**TO YOUR SPECIFICATIONS**

We offer a complete service for the Engineering, Development, and Manufacture of metal parts, assemblies, and machines.
Fully equipped, modern machine shop with complete production setup for all types of machine work.
Send blueprint or sample for prompt quotation without obligation.

**SOUTH SHORE MACHINE & TOOL WORKS, INC.**
Merrick Road Seaford, New York

## METAL STAMPINGS
• TOOLS • DIES •
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*HEAT TREATING*
## THOMAS & SKINNER
**STEEL PRODUCTS CO.**
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**WIRE AND METAL SPECIALISTS**
in round, flat, square and special shaped wire in all metals.
**LARGE PRODUCTION CAPACITY**
Plating and finishing.
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BLOOMFIELD, N. J.

Long runs for Turret Lathe & Milling Machines.

**VAHL ENGINEERING CO.**
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## AVAILABLE SCREW CAPACITY
**¼ to 4½ Automatic and Hand Screws**
*Including Necessary Secondary Operation*
*Forward Samples and Blueprints for Quotations*
**BRIDGEWATER SCREW PRODUCTS CO., Bridgewater, Mass.**

## COMPLETE MANUFACTURING FACILITIES

The following manufacturing facilities are available

A complete organization and plant to carry out the following processes: Tool Jigs, Fixtures and Gauges: General Machine Shop (including automatics): Press Shop: Sheet Metal Shop: Acetylene and Arc Welding: All kinds Electroplating: Spray-Painting: Wood-Working: Foundry (grey iron): Assembly Shop (light and medium).

*Communicate with W. J. Anderson for additional information.*

**RELIANCE INDUSTRIES LIMITED**
BELLEVILLE ONTARIO
CANADA
PHONE: 2470

**PRECISION FORM GRINDING**

Specialists in grinding Circular and Flat FORM TOOLS, FORM Counterbores, FORM Flat-Drills, and related types of FORM grinding. Also step-grinding of Tungsten and Molybdenum Rods.

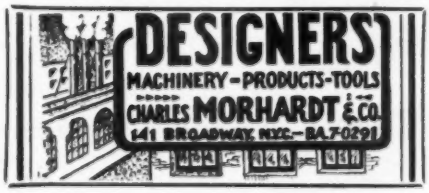
*Send Prints for Quotation and Delivery*
J. & S. TOOL CO.—477 Main St.—E. Orange 1, N.J.
(Makers of J.&S. Radii & Eagle Dressing Tools)

## EXCESS CAPACITY AVAILABLE:

Guaranteed Machine Tool Rebuilding—Special Machinery and Parts—Contract Work.

*Estimates cheerfully furnished*

**BARRETT MACHINE TOOL COMPANY**
Meadville, Pa.
(Since 1881)




TOOLS—DIES—JIGS—FIXTURES—GAGES
Tool Engineering—(Designing)

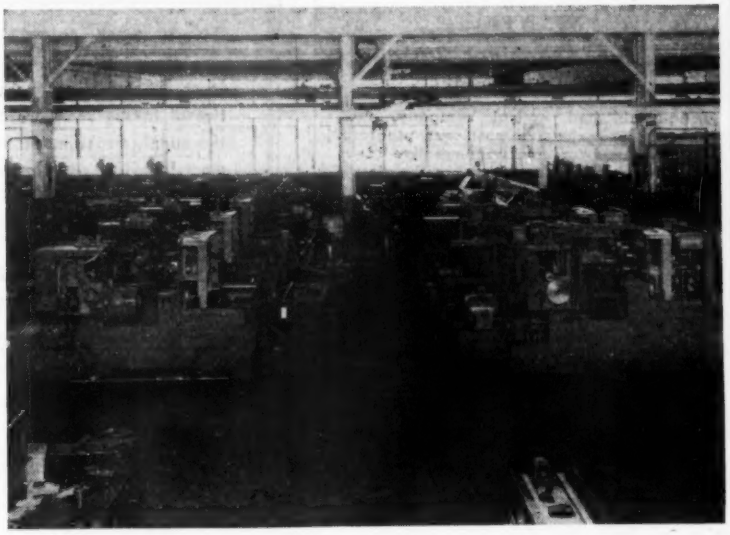
*Send us your samples or prints for quotations. Prompt and efficient service.*

**PRODUCTION TOOL COMPANY**
810 Sayler Ave. Knoxville 7, Tenn.

**PATTERNS in WOOD and METAL**
For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us - we will take care of them.
**GENERAL PATTERN WORKS**
2233 Buck Street Cincinnati, Ohio

***Additional Contract Work Advertising on page 351***

Lucas THE LAST WORD IN REBUILDING MACHINE TOOLS



## A battery of model 61 New Britain Gridley Automatics being rebuilt » » » » »

**MORE** production—less down time for repairs and adjustment: that's what Lucas-rebuilding means to progressive plant managers. For forty years J. L. Lucas & Son, Inc., have specialized in rebuilding machine tools. We fully guarantee the accuracy of our rebuilt machines. Many of this country's leading manufacturers will enthusiastically testify that we build into them hundreds of hours of productive life. We believe it will pay you to consider putting our 52,000 square feet of floor space, our precision equipment and our skilled craftsmen, to work rebuilding your production machinery.

**THIS** is the eight in a series telling the story behind the LUCAS nameplate on machine tools.

*Send for our complete illustrated booklet "Rebuilding the Lucas Way"*

# LUCAS of BRIDGEPORT

**J. L. LUCAS & SON, INC. BRIDGEPORT 5, CONN.**


## CONTRACT WORK

(Continued from page 350)


### HONING CONTRACTS

*Equipped for Long Runs*

**HONE INTERNAL DIAMETERS for Closest Tolerances for Mirror-Like Finishes**

War production proved Honing superior method of finishing cylinders and bushings.

*Write for Details*

**PRECISION HONING CORP.**

**96 Chambers St. New York 7, N. Y.**

### MOULD MAKERS

Specializing in molds for the Rubber Industry also facilities for automatic screw machine work up to 11/16.

**M & N Machine Tool Works**

146 Orono Street Clifton, N. J.

AVAILABLE MACHINE CAPACITY, turret lathes to 2½" diameter bar capacity. General machine shop work. Assemblies. Punches and dies, fixtures, etc.

**Wayne Manufacturing Company**

HONESDALE, PA.


## SEARCHLIGHT SECTION

### POSITIONS VACANT

WANTED: TOOL DESIGNERS. Graduate engineer or equivalent, specific experience in design of tools, fixtures, gages, etc., for manufacture of small interchangeable metal parts and a definite interest in design problems. Good post-war prospects. State age, marital status, details of education, experience, draft status, present salary and expected salary. Enclose recent photograph or snapshot. Applicants must be able to obtain statement of availability. Remington Arms Company, Inc., Personnel Relations Division, Bridgeport, Conn.

WANTED: GUN Designers. Graduate engineer or equivalent, thoroughly trained in the fundamentals of mechanical engineering and in the design and development of sporting arms or small interchangeable metal parts. Ability to recognize and analyze weaknesses in design of mechanisms and invent simple, sturdy substitutes. Ingenuity and a liking for sporting arms are desirable. Good post-war prospects, state age, marital status, details of education, experience, draft status, present salary and expected salary. Enclose recent photograph or snapshot. Applicants must be able to obtain statement of availability. Remington Arms Company, Inc., Personnel Relations Division, Bridgeport, Conn.

### POSITIONS VACANT

WANTED: MACHINE Design and development engineers, Graduate engineer or equivalent, experienced in the design and development of automatic and semi-automatic machines, concerned with manufacture of sporting arms and sporting arms ammunition or with manufacture of small interchangeable metal parts. Creative ability and initiative are essential and a sound training in economic evaluations of manufacturing processes. Good post-war prospects. State age, marital status, details of education, experience, draft status, present salary and expected salary. Enclose recent photograph or snapshot. Applicants must be able to obtain statement of availability. Remington Arms Company, Inc., Personnel Relations Division, Bridgeport, Conn.

MAN WANTED: Man experienced in convention badge manufacture. In reply give full particulars. P-464, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

WANTED: MACHINE shop superintendent. Man experienced in machining, polishing and plating of brass castings for plumbing and automotive trade. Modern plant located in midwest. State experience and salary expected. P-451, American Machinist, 330 W. 42nd Street, New York 18, N. Y.

(Continued on page 352)


**WANTED**

### Works and Production Manager

By old, established, financially sound Mid-West corporation, employing 400 to 450 men. Must have successful pre-war background. We manufacture durable machinery of semi-heavy type. Operate foundry for own castings only. Prefer man not over 45 years. Give age and send photo. Give complete details in first letter regarding experience, health, education, and salary expected. Must have thorough knowledge of various production methods in plant of this size, and be qualified to operate plant at high overall efficiency. Permanent and with excellent immediate and future possibilities.

**P-443, AMERICAN MACHINIST**
**520 N. Michigan Ave., Chicago 11, Ill.**

**WANTED**

### CHIEF ENGINEER

In charge engineering department, old established company, sheet metal products, number employees 600. Brakes, presses, all types of welding, assemblies, and metal finishing. Preferably an engineering degree. Must have a record of proven accomplishment as chief engineer or assistant. Good executive and organizer. Thorough knowledge of design, tooling, and up to date on new developments and new processes. Salary open. Send complete resume of past experiences, including salaries earned in the past and salary expected.

**P-446, AMERICAN MACHINIST**
**330 W. 42nd St., New York 18, N. Y.**

**WANTED**

***Precision Machine Designers***
***Tool Engineers***

Long-established optical company, now engaged in extensive post war program, has openings for men with creative ideas and board work experience in the development and design of intricate machinery. Location, upstate New York. State full particulars, including age, education, experience. Enclose photograph if available. All replies strictly confidential.

**P-466, AMERICAN MACHINIST**
**330 W. 42nd St., New York 18, N. Y.**

## POSITIONS VACANT

*(Continued from page 351)*

WANTED AN experienced designer on die cast and plastic molds. Full time employment. Would appreciate references. P-450, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

TOOL DESIGN Engineer with Punch Press and Forge Shop experience. A. B. Chance Company, Centralia, Missouri.

## EMPLOYMENT SERVICE

SALARIED POSITIONS $2,500-$25,000. Reconversion is creating lifetime opportunities now. This thoroughly organized confidential service of 35 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated through a procedure individualized to each client's requirements. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details. R. W. Bixby, Inc., 266 Delward Bldg., Buffalo 2, N. Y.

## POSITIONS WANTED

MECHANICAL ENGINEER, age 42, with tools, dies, special machine design experience, method engineer, research and development egineer with proved supervisory ability along the lines referenced above, desires supervisory position with a progressive company. PW-420, American Machinist, 330 W. 42nd St., New York 18, N. Y.

JUNIOR MECHANICAL Engineer—Experienced in the design of mechanisms, with four years tool and die maker's background. Technical background consists of four years college in mechanical engineering plus four semesters industrial electronics.-Desires permanent position in test or experimental laboratory. Also capable of design and working in conjunction with shop on tool and fixture set ups. PW-439, American Machinist, 330 W. 42nd St., New York 18, N. Y.

EXECUTIVE WITH experience as research engineer, factory superintendent, tool and die shop owner. Have been in charge of development and design of special tools, jigs, machines and instruments for the past 6 years. One of my product designs soon to be announced by leading machine tool manufacturer. Another has been in production for the past 5 years. Age 43. Desires position as sales engineer. PW-453, American Machinist, 330 W. 42nd Street, New York 18, N. Y.

MECHANICAL ENGINEER: experienced in design, development, machine shop, production, managing. Good character, sound judgment. Desire responsible position with small or medium size firm. PW-454, American Machinist, 330 West 42nd Street, New York 18, N. Y.

SALE ADMINISTRATOR: or top executive assistant, experienced in marketing and new products. M.E. Cornell University—for the last twenty years employed with a firm manufacturing and selling technical hardware specialties as executive in the following positions—vice president, secretary-treasurer, general manager, sales manager, in charge of manufacturing, merchandising, organizing sales force, training and advertising. Basic training in engineering and sales power plant equipment. Position wanted in with company manufacturing technical, semi-technical products planning post-war developments. PW-455, American Machinist, 330 W. 42nd St., New York 18, N. Y.

*(Continued on page 353)*

## PROFESSIONAL SERVICES

Contract Termination Specialists
**CONSULTANTS, ADVISORS, NEGOTIATORS**
We will assume full charge of your
**TERMINATED WAR CONTRACTS**
Govt. Trained—Our charges included in post termination expenses.

**ROBERT L. COLLUM ASSOCIATES**
Room 837 11 West 42nd St., N. Y., N. Y.

## OPPORTUNITY FOR EXECUTIVE MECHANICAL ENGINEER

Must be capable of earning a minimum of $7500 annually. Assume responsibilities of taking complete charge of machine shop and development works. Must be thoroughly experienced with mass production precision work on small parts. Small electric motor experience desirable but not necessary. Excellent opportunity for permanet position and advancement with aggressive organization.

*Write full details in explanatory letter to*

**P-436, AMERICAN MACHINIST**
**330 WEST 42nd STREET NEW YORK 18, N. Y.**

**WANTED**

## MECHANICAL ENGINEER

Must be thoroughly experienced in all gear manufacturing problems as well as designing; only those with extensive gear experience need apply. Exceptional post-war opportunity. Write full history including name of university and year graduated; names and addresses of all former employers; age; salary desired.

**P-345, AMERICAN MACHINIST**
**330 W. 42nd St., New York 18, N. Y.**

**WANTED**

**ENGINEERS—JUNIOR AND SENIOR**

Must have thorough knowledge of modern machine tool design practice and must be willing to do board work. Excellent post war opportunities. Please give complete record of your past experience and address your replies to the

*Personnel Director*
**THE CROSS COMPANY**
**3250 Bellevue Ave., Detroit 7, Mich.**

**WANTED**
**Tool Engineer, Screw Machine Products**

Large screw machine products manufacturers, near Cleveland, over 70 years in business, have permanent position for a man experienced in designing jigs and fixtures to obtain maximum production from secondary or finishing operations equipment. State employment history and salary expected.

P-463, AMERICAN MACHINIST
520 North Michigan Ave. Chicago 11, Ill.

## MECHANICAL ENGINEER

Wanted by an Eastern Manufacturer of Dyeing and Processing Machinery. Prefer man about 35 to 45. Should be a graduate mechanical engineer with several years shop experience, must be a good organizer and well versed in modern shop and sheet metal practice. To take complete charge of Engineering Department with a force of 6 to 8 men. Submit an outline of your qualifications.

**P-414, AMERICAN MACHINIST**
**330 W. 42nd St., New York 18, N. Y.**

**WANTED**

## GRADUATE ENGINEERS

A progressive builder of precision machine tools located in the Middle West, has openings for two or three young graduate engineers. One opening is for design engineer, where previous experience in a similar line is highly desirable, but other openings are available. If you would like to affiliate with a well-established company that is small enough so that individual merit is bound to receive just recognition, write, giving age, educational qualifications, salary expected, and experience. Present employer will not be contacted without previous permission.

**P-430, AMERICAN MACHINIST**
**520 N. Michigan Ave., Chicago 11, Ill.**

**WANTED**

## MACHINE DESIGNERS

Experienced on the design of special machinery. Excellent opportunity for first class men interested in steady positions.

Only men 35-55 with a record of successful achievements will be considered. In replying furnish information preliminary to a conveniently arranged interview.

**THE TAFT-PEIRCE MFG. CO.**
**Woonsocket, R. I.**

## DRAFTSMEN — DESIGNERS

Needed in the Development and Research Department of an old established and progressive Chicago manufacturing company. Excellent opportunity for men with ingenuity and designing ability. Experience in drafting and designing small mechanical and electrical devices is required. Engineering degree desirable but optional.

**P-429, AMERICAN MACHINIST**
**520 N. Michigan Ave., Chicago 11, Ill.**

**ESTIMATORS, SCREW MACHINE PRODUCTS**

Large screw machine products manufacturers, near Cleveland, over 70 years in business, have permanent position for 2 men capable of estimating production and tooling costs on standard single and multiple spindle automatic screw machines. Experience on estimating production on secondary machines essential. State employment history and salary expected.

P-462, AMERICAN MACHINIST
520 North Michigan Ave. Chicago 11, Ill.

**MACHINIST—All Around**

to work and supervise precision shop in Peekskill, N. Y.; build machines, design and make molds. Splendid peacetime prospects for topnotcher. State full details, experience, salary desired.

Box 447, 217 7th Ave., N. Y.

## POSITIONS WANTED
(Continued from page 352)

ASSOCIATE EDITOR: M.E. and M.S. degrees, broad shop and technical experience; engineering journals, trade papers, house organs. PW-456, American Machinist, 330 W. 42nd St., New York 18, N. Y.

CHIEF ENGINEER: Mechanical and Master's degrees, good executive and organizer; machine tools, automatic machinery, medium and heavy machinery, gearing; design, mathematical analysis, research. PW-457, American Machinist, 330 W. 42nd St., New York 18, N. Y.

CHIEF DRAFTSMAN: Technical graduate, mechanical engineer's degree; actual designing and shop experience directing production of many types of machinery, organizer, instructor, producer. PW-458, American Machinist, 330 W. 42nd St., New York 18, N. Y.

EXECUTIVE MECHANICAL Engineer, age 42, with last 21 years spent in automotive and aircraft manufacturing, including job lot and production activity. Responsible for pools, dies, special machine design, method engineering, research and development engineering. Desires supervisory position with a progressive company. PW-459, American Machinist, 330 W. 42nd St., New York 18, N. Y.

FACTORY, ENGINEERING and general executive, 44 years of age. Positions held during 20 years, include—works manager, chief engineer, production mgr., tooling supt., chief tool designer, ass't chief engineer, chief of planning and methods, research eng., etc. Equally experienced in sheet metal, machining and assembly as well as machine tool and special machinery design and manufacture. Desire position where experience and ability can be fully utilized so that salary commensurate with such wide experience can be paid. PW-460, American Machinist, 330 W. 42nd St., New York 18, N. Y.

## BUSINESS OPPORTUNITIES

MACHINE SHOP, well equipped, established many years serving logging, sawmill, and farming area, Western Oregon college town. Owner desires to retire. Columbia Engr. Co., Porter Bldg., Portland 4, Oregon.

## PATENT ATTORNEY

PATENTS, COPYRIGHTS, Booklet, "General Information concerning Inventions and Patents" and "Free Schedule" sent without obligation. Established 1915. Lancaster, Allwine & Rommel, Suite 453, 815-15th St., N.W., Washington 5, D. C.

## SELLING OPPORTUNITIES
### OFFERED—WANTED
Selling Agencies—Sales Executives
Salesmen—Additional Lines

## OFFERED

WANTED SPECIALTY salesmen to sell small grinding fixture. This is fast selling, also repeats. Prefer salesmen who are making direct contact with factories. Letter should contain full particulars plus territory now covering. Territory available in many sections. P. O. Box 113, Brookville, Ohio.

REPRESENTATIVE WANTED to sell a line of tool room specialties, direct to tool and machine shops. Frank McMahon Co., 142 S. June St., Dayton 3, Ohio.

REPRESENTATION AS manufacturers agents wanted for the following: stamping, screw-machine parts, plastics, die castings springs, rubber products and moulds. Other kindred lines for distribution in Detroit, Chicago, St. Louis, Kansas City. R. O. Sheldon and Company, Industrial Engineers, 850 New York Life Bldg., Kansas City, Mo.

## WANTED

GRADUATE ENGINEER, twenty years equipment and mill supply sales, desires additional lines for Southwest area. Acme Engineers, Box 5155. Houston 12, Texas.

SALES MANAGER: traveling three trips yearly for the past ten years in the United States and Canada calling on 420 manufacturers representatives and mill supply companies with approximately 1700 men wants two additional lines on straight commission basis for National distribution. Prefer a machine tool line or precision tools. Reference exchanged at personal interview. RA-461, American Machinist, 330 W. 42nd St., New York 18, N. Y.

ESTABLISHED MACHINERY Dealers experienced in production and process engineering traveling thru Indiana, southern half of Ohio and Kentucky are looking for additional lines having good sales possibilities for normal times, requiring engineering background. RA-462, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

## PLANT EXECUTIVE AVAILABLE

Technical graduate, age 48, 26 years of practical machine shop experience in shop supervision, tool design, production control, labor relations, and management desires change. Proven record in the application of cost cutting methods.

**PW-445, AMERICAN MACHINIST**
**330 W. 42nd St., New York 18, N. Y.**

AVAILABLE
## ADVERTISING MANAGER

Capable in special machine tool sales promotion . . . Thoroughly familiar with trade-paper, direct mail, catalog and motion picture media. Age 44.

PW-449, AMERICAN MACHINIST
330 West 42nd St. New York 18, N. Y.

*Prominent Australian Company*

With representative visiting the United States of America and Canada, wishes to augment its Agency business and is ready to represent in Australia, the manufacturers of Ships, Dredges, Diesel Engines, Winches, Windlasses, anti-fouling Paints, Tool Steels, etc., prefabricated houses, and manufactured articles for Agriculture, Mining, Shipping, Building, Hardware and Foundry Trades.

Please write to:—"TRADE LINK"
C/—Australian Trade Commissioner's Office
6630 Fifth Avenue New York

## MANUFACTURERS

Sales Engineer covering New England and eastern New York wants line of anti-friction bearings and affiliated lines. Exceptionally well known. *Address*

RA-447, AMERICAN MACHINIST
330 West 42nd St. New York 18, N. Y.

*Exceptional Opening for*
## SALES ENGINEER
### to cover Mid-West Metalworking Industry
**Selling Experience Desirable**
**But Not Essential**

Nationally known manufacturer of production material wants man to advise customers on applications—not take orders—in the middle west area centering in St. Louis. Salary to be commensurate with experience.

Requirements: Varied knowledge of metalworking production gained by plant work or selling; ability to travel away from home. Write in detail about background; enclose photo. Interview arranged at New York headquarters; expenses paid, if necessary.

**SW-434, AMERICAN MACHINIST**
**330 W. 42nd St., New York 18, N. Y.**

WANTED: MANUFACTURERS AGENTS in states covering industrial cities. Newly developed precision tool that will save a lot of time and increase accuracy in laying-out, checking, and measuring in hard to get in places. Commission basis. No objections to other lines.

MODERN MACHINE TOOL CO.
7572 E. Robinwood Detroit 12, Michigan

## WANTED
## SALES ENGINEERS

To represent a modern gear manufacturing plant. Must have a degree in mechanical engineering as well as extensive selling experience in the gear industry. Write full details including name of university and year graduated; names and addresses of former employers; salary and territory desired and other pertinent details.

**SW-410, AMERICAN MACHINIST**
**330 W. 42nd St., New York 18, N. Y.**

## SALES & SERVICE REPRESENTATIVES

Men under 45 years of age with previous sales or service experience and knowledge of manufacturing operations or mechanically inclined. Several established territories including some in Mid-western location. Men must be able to relocate. Car essential. Trained in New York at our expense to qualify in use and servicing of our cleaning, drawing, stamping, cutting and rust-proofing materials. Excellent opportunity for right men now and in post-war period as our organization sells to and serves practically every type of industry. Attractive compensation arrangement. Give full details of age, experience etc. Replies treated confidentially.

**RW-448, AMERICAN MACHINIST**
**330 W. 42nd St., New York 18, N. Y.**

## FOR SALE

Going concern in small Industrial Town, located 30 miles from Toronto; fully equipped for Automatic Screw Machine Production with large and small Automatic Screw Machines, Cinn. Millers, Hardinge & South Bend secondary operation machines; battery of small Bench Drills; Punch Presses suitable for a self contained manufacturing proposition.

Thoroughly modern plant in all respects. Owner retiring due to ill health.

**BOX 379, GEORGETOWN, ONTARIO**

Hardware manufacturing plant for sale. Light. Midwest. Established 1880. All post war work. $200,000 annually through hardware jobbers. Seventy employees. Now operating. Obtain information through

R. O. SHELDON & COMPANY
Industrial Engineers
850 NEW YORK LIFE BLDG.
KANSAS CITY, MO.

## Managing Director

Of large Steel Foundry and Engineering Works in Australia will be visiting The United States of America and Canada shortly seeking arrangements to manufacture proprietary and standard lines particularly those involving steel castings although also capacity for cast iron. Any special Plastic proposition would also be investigated. All communications addressed to

"STABILITY",
C/—The Union Bank of Australia Limited,
C/—Brown Bros. Harriman & Co.,
Wall Street, New York
will receive careful attention.

## OVER 2½ MILLION DOLLAR PUBLIC AUCTION SALE
## SURPLUS MACHINERY & EQUIPMENT

BY ORDER OF THE

**WEST PITTSTON IRON WKS, INC.,**
**211 Fremont St., W. PITTSTON, PA.**

**Horton & S. Franklin Sts., WILKES-BARRE, PA.**
**WILKES BARRE CARRIAGE CO., Inc.**

**and THE PENCOYD REALTY CO.**

(AT THE ABOVE PREMISES)

**SALE DATES: OCTOBER 30th, 31st and NOV. 1st, 1945**

*(Starting at 10:30 A.M. Each day.)*

***Sale Will Start At* WEST PITTSTON IRON WKS., INC.**

*Inspection Date: Monday, October 22nd, to Sale Date.*

**— MACHINERY COMPRISES —**

35 LATHES: From 12"x5' to 36" to 27'—including: AMERICAN, MONARCH, LEBLOND, LODGE & SHIPLEY, HENDEY and others, many GEARED HEAD.

21 TURRET LATHES: Including #2A, 3A, 4A—including: WARNER & SWASEYS, MOREY, BARDON & OLIVER, GISHOLT, GREENLEE and others.

63 MILLING MACHINES: including: MILWAUKEE DOUBLE OVER-ARM, CINCINNATI HI-POWER, BROWN & SHARPE, ROCKFORD, OHIO, BECKER, INGERSOLL—Plain, Universal, Vertical, Production and Slab Milling—including 28/60 CINN. HYDROTEL, #5 REED PRENTICE VER. MILL & JIG BORER.

40 RADIAL DRILLS: including 2½' to 7' AMERICAN HOLE WIZARD, CINN., BICKFORD, MUELLER, WESTERN, Etc.

26 UPRIGHT DRILLS: including: BAKERS, COLBURNS, CINCINNATI, EDLUND, BARNES, SUPERIOR, Etc.

39 GRINDERS: including: CINN. FILMATIC, LANDIS, REID, BROWN & SHARPE, BLANCHARD, HEALD, NORTON, CARBALOY, Plain, Universal, Surface, Internal, Tool & Cutter, Snagging, Double End—and others.

13 HOR. & VER. BORING MILLS:—including: BULLARD NEW ERA, KING VERTICALS, 3¾" bar CINN. GILBERT and others.

5 SHAPERS: 16" and 24" ROCKFORD HYDRAULIC, GOULD & EBERHARDT, CINN.

20 PLANERS: 36"x36"x10' to 54"x54"x20' CINN. GREY, N.B.P., Many with 4 heads, box table, D.C. reversing motor drive.

7 GEAR CUTTERS: #6 FELLOWS, GLEASONS, B & S., and others.

8 SLOTTERS: Up to 24"—including: DILL, N.B.P., SELLERS, BETTS, etc.

8 SAWS: DO-ALL, GROB, PEERLESS, TOLEDO, Etc.

WELDING EQUIPMENT: #41 AIRCO TRAVOGRAPHS, #10 PLANOGRAPHS, #10 RADIOGRAPHS, PORTABLE WELDERS, Etc.

ALSO: Complete heat treating department—G. E. Industrial X-Ray Dept., 85 Yale & Towne & Budgit Hoists, Office Equipment, Precision Tools, Factory Equipment, Electric Cranes, Motor Generator Sets, Hydraulic Presses, Motors—and thousands of items too numerous to mention.

ALL MACHINES ARE INDIVIDUALLY MOTOR DRIVEN.

***IMPORTANT: A COMPLETE AND DETAILED AUCTION CIRCULAR WILL BE SENT YOU FREE ON REQUEST—SEND FOR YOUR COPY NOW!***

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*Auctioneers Appraisers, Liquidators*

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**316 S. LaSALLE ST., CHICAGO 4, ILL.** **(PITTS., PA.—TOLEDO, O.)**

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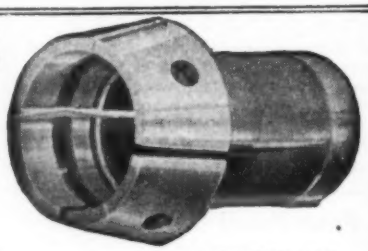
## USED COLLETS
### FEED FINGERS — PADS



ACME, No. 515, No. 52, No. 53, No. 54, No. 55, No. 56.
ACME-GRIDLEY 1⅛"
Cleveland ⅞" to 2½".
Cone 1¼", 1½", 2½", 4".
Foster No. 1, No. 2, No. 3, No. 4, No. 5, No. 7.
Gridley, Models F, ¾", ⅞", 1¼", 1⅜", 2¼", 2⅜",3¼", 4¼".
⅞ Model "G" Gridley Form, Lead and Cut Off Cams.
No. 4 No. 6 Warner & Swasey.
Bardons & Oliver, Brown & Sharpe, Davenport, Garvin.
LARGE STOCK OF ⅝x5 NEW BRITAINS.
Change Gears, Lead Cams, Form Cams, No. 53 to No. 56 Acme.
Spindle gears, finger holders, collet tubes, push tubes, spindles, nose pieces for 2⅝" F Gridley.
Large stock 1⅜" F. Gridley Collets.

**SPECIAL Die Heads and Chasers**

MDNA MEMBER

**GRAFF MACHINE TOOL COMPANY**

**7140 S. Halsted Street** *Vincennes 9664* **Chicago 21, Ill.**

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## *For Sale*
## 1⅞" Cone Automatics

***4 Spindle—Motor Drive***

These Units were built in 1930, but reconditioned recently—"Now in Operation"—Complete with Stock Reels, Collets, Pushers, auxiliary Spindles, and about $2,000.00 inventory of repair parts.

*4 AVAILABLE*

**GLOBE TRADING COMPANY**
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## SHEET METAL MACHINERY

NEW and USED—Hand and Power Brakes, Shears, Forming Rolls, Folders, Punches, Rotary Machines, Stakes, Spot and Arc Welders

MDNA MEMBER

**B. D. BROOKS, INC.**
361 Atlantic Ave., Boston, Mass.

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## FOR SALE

1—Twin Openside Planer
1—6 ft. Prentiss Radial Drill
1—24" Dill Slotter
1—Patch Granite Polishing Machine
1—Pond Lathe 24" swing
3—Double Platen Patch Planers

*Prices on application*

**VERMONT MARBLE COMPANY**
**PROCTOR** **VERMONT**

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## FORGING EQUIPMENT

7" Ajax Upsetting Forging Machine
1500# Chambersburg Forging Hammer
3000# Chambersburg Steam Drop Hammer

IRON & STEEL PRODUCTS, INC.
13496 S. Brainard Ave. Chicago 33, Illinois
*ANYTHING* containing IRON or STEEL"

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## UNIVERSAL TOOLS!

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If It's A Tool—We Have It, Can Get It, or It Isn't made! PRICE LIST & ORDER BLANK FREE!!
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O. B. Domattois, President
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Immediate Shipments: Overnight by Air: To Anywhere—U.S.A.

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## WANTED

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## WANTED

No. 18 motorized Bliss Power Press or equal with standard automatic roll, single feed and reel stand for half-inch 013 flat wire.

W-465, AMERICAN MACHINIST
330 W. 42nd St. New York 18, N. Y.

EVERY ITEM GUARANTEED AS REPRESENTED

# FALK FOR DEPENDABILITY IN REBUILT MACHINERY

## AUTOMATICS

6—#61 New Britain-Gridley 6 Spindle 1⅝" cap. Automatic Screw Machines. A.C. Motor Drive, Threading Spindle.
1—1¼" Cone 4-spindle Automatic, Motor Driven, Threading Spindle.
1—#515 National Acme 4-Spindle Automatic.
2—#55 National Acme 1⅝" 4-spindle Automatics, complete.
1—#2G Brown & Sharpe Automatic.
1—#1 Brown & Sharpe Automatic, old style.

## BORING MILLS

100" Niles-Bement-Pond Bor. & Turn. Mill.
Horiz. #36 Landis-Rochester, 3½ Bar Floor Type—Floor Plate 72" x 120".
42" Bullard Vertical Boring Mill with side head; New Era Type.
#31 Lucas Horizontal Boring Mill, 3" bar.

## DRILLING MACHINES

Bickford 4-spindle Rail Drill, #4 Morse Taper. Table 20" x 67".
Avey, 2 & 3 spindle Prentice, 4 spindle.
Henry & Wright, 6 spindle.
Woodward & Rogers, 6 spindle.
Fosdick 13", 4 spindle (2). 2 spindle (1).

## RADIAL DRILLS

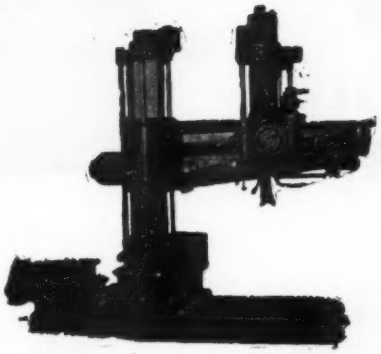
3' 9" col. American, S.P.D.
3' Dreses, 10" rd. col. QCG., M.D.
3' Fosdick 10" Col. Motor Drive.
5' Arm 13" Rd. Col. Cinn. Bick. air clamp.
6' Arm 14" Col. Cincinnati Bickford.

## GRINDERS

12" No. 22 Heald Rotary Surface Grinder.
16" Persons-Arter Rotary Surface Grinder.
#4 Brown & Sharpe Universal Grinder.
#12 Greenfield Internal Hydromatic Grinder, sizematic type, complete with Tank and Pump. 15" swing, 5" hole, 4" dee.
Oliver Model 51 Drill Grinder; 1½" cap.
6"x32" Norton Cyl., overhead c/s drive.
#2 Brown & Sharpe Surface Grinder.
#70 Heald Internal Grinder.
#60 Heald Cylinder Grinder.
3—#2 Cincinnati Centerless Grinders.
1—4x12 Landis Hydraulic Cylindrical Grinder, New.

Blanchard Grinder #16, 30" dia. Magnetic Chuck, 25 HP 3-60-440 V. Motor.

Pratt & Whitney Vertical Surface Grinder, 14"x36" with 10"x36" Magnetic Chuck. Ball Bearing Spindle. Perfect Condition.



**Cincinnati-Bickford 5' Arm, 13" round column with air clamp. Oil grooved, tee slotted base, side base, with plain box table with #5 Morse Taper spindle. Motor drive.**

## LATHES

14 x 6 Pratt & Whitney semi—Q.C.G.
16 x 8 Hendey Arranged M.D., Taper
16" Warner & Swasey Fox Brass (2).
16" Dreses Fox Brass.
Putnam, 26 x 12 Heavy Q.C.G., arr. for M.D.
Potter & Johnston #6A Automatic Chuckers; 3½" dia. hole in spindle (2).
14 x 6 Hendey Toolroom Lathe, G.H., M.D.
14x8 LeBlond Toolroom Lathe, cone drive.
14"x6' Hendey 12-speed geared head.
14"x102" centers Hendey motor driven Lathe.

## MILLING MACHINES

#3, #4, #5 Cinn., High Power, Plain, S.P.D.
No. 0 Bickett Vertical Bench Miller.
#1-#1½-#2 Brown & Sharpe Plain Millers.
P & W 2½" Duplex Spline Miller.
Hall Planetary Thread Miller 24".
No. 8 Lees Bradner Thread Miller.
#1-#2—Kempsmith Plain Milling Machines
#2½ #3 LeBlond Universal.

## PLANERS

120"x72"x35' Betts, 4 Heads, M.D.
48"x48"x12' Putnam Heavy, 2 Heads, M.D.
30"x30"x12' American M.D., 2 Heads.
30"x30"x10' Cinn. Heavy Pattern, 2 Hds.
20"x20"x24" N.-B.-P., Planer Shaper, M.D.

## POWER PRESS HEADQUARTERS

#4½ Bliss D.C. B.G. Forging 3" stroke.
200 ton A.C.F. Hydraulic Press. Bed 24"x 36", 4-post.
7—25 ton Model SL2 K.R. Wilson hydraulic Presses.
Beck Duplex Embossing Press.
75 ton H.P.M. 2 post, Hydraulic Press.
#1 Bliss Straight Side, double action, Cam Press. Will draw and lift out 2¾".
#69N Bliss O.B.I. Cam.

## SHAPERS AND GEAR CUTTERS

12" Schuchart & Schutte Gear Hobber.
#1 Adams Gear Hobbers, Belt driven (3).
#13 Brown & Sharpe Spur & Bevel Gear Cutter.
24" Potter & Johnston Crank Shaper, universal table, power feed to head.

## SHEARS & METAL CUTTING MACHINERY

Lennox Splitting Shear, ¾" cap.; 8' throat.
Lennox Bevel Shear, ¾" cap.
Bliss #232 Slitting Shear, 14 ga.
Gould & Eberhardt Slitting Shear, 10 ga.
Niagara 16 ga. x 42" Gap Foot Shear.
Niagara #9S Power Seamer.
Niagara 4"x42" Geared Slip Roll Former.
Niagara 3" x 36" Geared Slip Roll Former.
Niagara 48" Roller Leveller. 6 Roll.
Niagara #30 and #0 Beader & Flanger.
Niagara #4-E Squaring Shear, 48" x ¼" capacity, M.D.
Cleveland 8'x⅜ Plate hear.

## MISCELLANEOUS

Waterbury-Farrel Cold Header, double stroke, open die, ½" cap. & 6".

Manville Cold Header, single stroke, solid die, 3/16" cap.

J. C. Miller Co. Lacq. Heater with acquistat.
Heat Treating Furnaces for the tool room.
Sleeper & Hartley #1 Wire coiling machine for making BX cable.
50 K.W. Moesta Gun Welder Transformer, portable, 25 cy. 440 volts.
Hydraulic Pumps—Hele Shaw, Racine, Oil Gear, Motor Driven.
Blake and Knowles 12x2x12 Simplex Type, Hydraulic Steam Pump, 2000 lbs. pressure with 80 to 125 lbs. steam, delivers 9 gallons per minute.
#228C Greenlee Vertical Hollow Chisel Mortizer, Power feed, M.D.
No. 7B High Speed Riveting Hammer, cap. ¾" to 1½". New this year.
Standard Automatic Drop Hammer, 300#.

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MACHINERY COMPANY
Machinery Merchants

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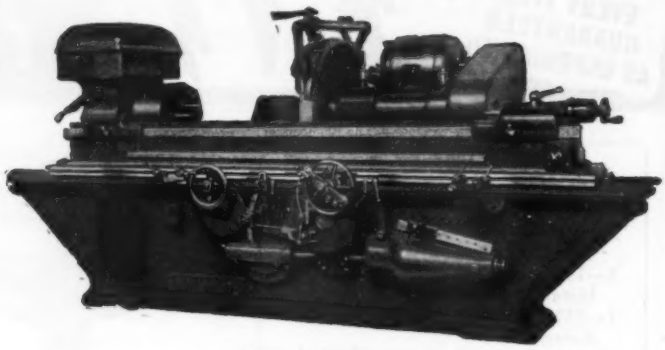
# HILL-CLARKE
## *Modernized*
## CYLINDRICAL GRINDERS *for* SUPER-GRINDING *and* MICRO-FINISH



**SIZES AVAILABLE**

| | | |
|---|---|---|
| 10x24 | 14x36 | 16x50 |
| 10x36 | 14x50 | 16x72 |
| 10x50 | 14x72 | 18x96 |
| 10x72 | 14x96 | 18x120 |
| 10x120 | 16x36 | |

Hill-Clarke Modernized and Motorized Cylindrical Grinders offer refinements in design which minimize vibration and assure extreme accuracy on all grinding operations. One of these refinements, the Hill-Clarke patented Multiple V-belt Drive to work spindle, contributes to the smoothness in operation which makes possible a finish within a few micro-inches even when using standard grain free-cutting wheels.

*Send for a copy of our catalog "Super Grinding."*

Have you any NORTON grinders you wish modernized and motorized?

HILL-CLARKE MACHINERY CO.

651 WASHINGTON BOULEVARD — CHICAGO 6, ILL.

# MOREY *DEPENDABLE* USED MACHINERY

**BORING MILLS—Horiz.—Vert.**

BULLARD 42" Vert. N.E. type—M.D.
GISHOLT 42" Vert.—2 heads
N.B.P. 1½" bar Portable floor type—Horiz.

**DRILL PRESSES**

AVEY No. 3, single spindle
AVEY No. 2, 3-spindle
COLBURN D-2 Upright
NATCO No. 12, multiple spindle

**GEAR CUTTERS**

BROWN & SHARPE No. 13
FELLOWS No. 712
GOULD & EBERHARDT 36" Hobber

**GEAR GENERATORS**

GLEASON 3" and 6" Straight
GLEASON 10" and 15" Spiral
GLEASON 12" Straight

**GRINDERS**

NORTON 24" x 240" Plain
ARTER 8" Rotary Surface
ARTER Automatic Piston Ring
UNIVERSAL Hydraulic Spline Shaft
BROWN & SHARPE #4 Universal

**LATHES—Engine & Turret**

SOUTH BEND 11" x 4'
LeBLOND 25" x 18' geared head
LODGE & SHIPLEY 30" x 26'; 2-carriages
MOREY #2G Turret; 1" capacity
MOREY No. 3 Universal Turret; 1½" capacity
MOREY #4 Universal Turret; 2" capacity
WARNER & SWASEY No. 3A Univ. Turret

**MILLING MACHINES**

BROWN & SHARPE No. 3A Universal
MILWAUKEE No. 3B Universal
CINCINNATI No. 3 Vertical
BROWN & SHARPE No. 3 Vertical
MOREY 12" x 60" Thread
PRATT & WHITNEY 6"x20" Thread Model B
PRATT & WHITNEY 6x132" Thread
RICE BARTON 4" Duplex Spline
PRATT & WHITNEY 4" Spline
INGERSOLL 48"x48"x16' Adj. Rail, 4 swivel heads
INGERSOLL 36"x33"x8' Adj. Rail, planer type; 3 heads

**PLANERS**

GRAY 24"x24"x6'—1 head
CINCINNATI 36"x36"x10'—4 heads
HAMILTON 42"x42"x20'—4 heads; DC motor drive
GRAY 48"x48"x16'—4 heads
GRAY 72"x48"x12'—2 heads
WOODWARD & POWELL 60"x60"x20'—4 heads
CINCINNATI 120"x96"x20' rapid traverse—4 heads; DC reversing motor drive.

**SHAPERS—Horiz. and Vert.**

MOREY 8" and 12" Vertical
PRATT & WHITNEY 6" and 10" Vertical
MORTON 30" Draw Cut—Horizontal

**MISCELLANEOUS**

DILL 18" Slotter
ESPEN LUCAS No. 138 Cold Saw—12" Cap.
SAUNDERS 8-18" Pipe Machine
TREADWELL 12" Pipe Machine
MORTON 60" Stroke Planing & Boring Machine

**PARTIAL LIST — *Send us your specific inquiry.***

MOREY MACHINERY CO., Inc.

410 BROOME STREET — NEW YORK, N. Y.

# IMPORTANT NEWS FOR MACHINE TOOL BUYERS

## BORING MILLS

24" BULLARD New Era Vertical with one swiveling turret head and one side head. AC or DC motor drive.

42" BULLARD New Era Vertical with one swiveling turret head and one side head. AC or DC motor drive.

66" NILES - BEMENT - POND Vertical Heavy Duty Tire Boring and turning Mill with two swiveling heads. AC or DC motor drive.

NO. 1 PUTNAM Vertical Car Wheel Boring Mill with side head for hub facing and hoist. AC or DC motor drive.

48" NILES-BEMENT-POND Car wheel Boring Mill with hoist. AC or DC motor.

96" NILES-BEMENT-POND Vertical with two swiveling heads, Power Rapid Traverse. AC or DC motor drive.

120" BETTS Heavy Vertical with two swiveling heads, Power Rapid Traverse, AC or DC motor drive.

120" NILES-BEMENT-POND Vertical with two swiveling heads, Power Rapid Traverse. AC or DC motor drive.

120" CINCINNATI Massive Pattern Vertical with two swiveling heads, Power Rapid Traverse. AC or DC motor drive.

10'-16' CINCINNATI extension Type Vertical with two swiveling heads, Power Rapid Traverse. AC or DC motor drive.

NO. 32 3¾" Bar LUCAS Horizontal Table Type Boring, Drilling, and Milling Machine, Power Rapid Traverse. AC or DC motor drive.

5½" Bar NILES-BEMENT-POND Heavy floor Type Horizontal Boring, Drilling, Milling Machine. AC or DC motor drive.

## RADIAL DRILLS

4' HAMMOND High Speed Sensitive Drill, Lever Feed with Tapping Attachment, AC or DC motor drive.

5½' AMERICAN Full Universal Triple Geared with tapping attachment. Single pulley belt drive or AC or DC motor dr.

6' CARLTON Plain 15" round column with DC motor on arm, tapping attachment.

8' NILES-BEMENT-POND "Right Line" Plain with 230 volt DC motor on arm, tapping attachment.

## GRINDERS

12" O.S. WALKER Single Stroke Surface Grinder with 12" dia. magnetic chuck and 7½ HP, AC or DC motor.

NO. 16 BLANCHARD High Power Vertical Surface Grinder with 26" magnetic chuck and 20 HP, AC or DC motor.

NO. 1 BESLEY Disc Grinder with two 12" dia. steel discs and two plain tables, belt drive through countershaft.

## LATHES

27"x12' AMERICAN 8 speed geared head, 96" between centers. AC or DC motor.

42"x36' PUTNAM Geared Head, 25' between centers. Quick change gear box. AC or DC motor drive.

48"x30' BRIDGEFORD 9 speed geared head, 20' between centers. Triple geared internal face plate drive. AC or DC.

48"x20' NILES-BEMENT-POND Extra Heavy Geared Head, 11'5" between centers. Power cross and angular feed to compound rest. Semi-quick change gear, taper attachment.

48"x59' BRIDGEFORD Boring and Turning with 9 speed geared headstock, turning carriage with compound rest, AC or DC motor drive.

NO. 4 PUTNAM Extra Heavy Center Drive Axle Turning Lathe with two carriages. AC or DC motor drive.

27" Swing 98". Centers BRIDGEFORD Plain Turning Lathe for car axle or heavy forgings, two carriages and tool rests. Single pulley belt drive or AC or DC motor drive.

42" PUTNAM Heavy Double End Car wheel lathe. Equipped with overhead hoist for loading wheels and axles.

72"x77' (65'-6" centers) NILES-BEMENT-POND Heavy Geared Head Lathe. Two carriages with compound rests, power cross and angular feed. Power rapid traverse. Taper attachment.

## MILLERS

NO. 2 CLEVELAND Plain, table 13"x50" B & S Taper No. 11. Single pulley belt drive or AC or DC motor.

NO. 3B BROWN & SHARPE Plain with double overarm table 14"x60" with 7½ HP, AC or DC motor.

NO. 3 KEARNEY & TRECKER Plain, dial type feeds. Power rapid traverse, table 16"x60", AC or DC motor in base of column.

NO. 4 CINCINNATI High Power Plain. Power rapid traverse table 16½"x64". Single pulley belt drive or AC or DC motor drive.

NO. 5B BROWN & SHARPE Plain, Power rapid traverse, table 22"x81". AC or DC

NO. 1½ KNIGHT Vertical Milling and Drilling with power longitudinal feed to tilting table. Table 7½"x29", AC or DC motor drive.

NO. 4 CINCINNATI High Power Vertical, Power rapid traverse. Table 16½"x 64". Single pulley belt drive or AC or DC motor drive.

24"x24"x12' INGERSOLL Horizontal Spindle Slab Miller with adjustable rail, table 24"x12'. AC or DC motor drive.

30"x30"x10' NEWTON Horizontal Spindle Slab Miller with adjustable rail, table 27"x11'. AC or DC motor drive.

24"x36"x12' INGERSOLL Planer Type side milling machine with two power feed heads on housings for side milling only.

24"x24"x12' INGERSOLL Planer Type milling machine with one head on adjustable rail and two side heads, AC or DC motor drive.

42"x26"x12' INGERSOLL Planer Type milling machine with two heads on adjustable rail & two side heads, AC, DC.

## PLANERS

36"x36"x14' PUTNAM Heavy Planer with two heads on rail. 230 Volt DC reversing type planer motor and control.

38"x38"x14' OHIO Heavy with two heads on rail and one side head. 230V DC reversing type planer motor and control.

48"x48"x16' NILES - BEMENT - POND Heavy with two heads on rail and two side heads. 230V DC reversing type planer motor and control.

48"x48"x18' G.A. GRAY Spiral Drive with two heads on rail and one side head. AC motor drive with self-contained countershaft.

48"x48"x24' NILES - BEMENT - POND Heavy with two heads on rail and two side heads. 230 Volt DC reversing type planer motor and control.

48"x48"x32' G. A. GRAY Spiral Drive with two heads on rail and two side heads. 230 Volt DC reversing type planer motor and control.

48"x48"x24' NILES - BEMENT - POND Heavy with two heads on rail and one side head. AC motor drive through self-contained countershaft.

48"x48"x20' F. R. PATCH Heavy with two heads on rail and two side heads. 230V DC reversing type motor and control.

60"x48"x18' G. A. GRAY widened Spiral Drive with two heads on rail and one side head. AC motor drive.

72"x72"x18' NILES - BEMENT - POND Heavy, two heads on rail and two side heads. 230 Volt DC reversing type planer motor and control.

72"x72"x20' NILES - BEMENT - POND Extra Heavy, two heads on rail and two side heads, 230 Volt DC reversing type planer motor and control.

84" WIDENED TO 98"x32"x42' SOUTHWARK Extra Heavy, two rail heads and two side heads. 230 Volt DC reversing type planer motor and control.

16'x10'x30' BETTS heavy, two heads on rail and two side heads, forced feed lubrication. 230 Volt DC reversing type planer motor and control.

## MISCELLANEOUS

6" PRATT and WHITNEY Vertical Shaper.

NO. 3 CRESCENT Double Arbor Saw Table, table top 36"x48", diameter of saws used 16", AC or DC motor drive.

30' NO. 3 HILLES JONES Plate Edge Planer.

30'x⅞" NILES-BEMENT-POND Plate Bending Rolls, pyramid type.

14'x½" NILES-BEMENT-POND Plate Bending Rolls, pinching type.

---

**SIMMONS MACHINE TOOL CORPORATION**

**MAIN OFFICE AND PLANT: 1759 NORTH BROADWAY, ALBANY 1, NEW YORK**

**NEW YORK OFFICE: 50 EAST 42nd STREET, NEW YORK 17, N. Y.**

# QUALITY *Machine Tools*

## NOW IN STOCK

**No. 61—1⅝" NEW BRITAIN SIX SPINDLE AUTOMATIC SCREW MACHINE, with bar equipment, new in 1943.**
**No. 2, 3 CINCINNATI CENTERLESS GRINDERS, 6" grinding wheel, 8" regulating wheel, thru-feed rest, motor driven, V-belt drive.**

### AUTOMATICS

⅞" Cleveland Model M, four spindle.
⅝" Gridley Model F, four spindle.
1" x 5" New Britain, six spindle.

### DRILLS

★ **4 Ft. Canedy-Otto Radial Drill, motor spindle, 11" column, new in 1942.**
No. 416 Baker, single spindle.
★ **21" Cincinnati-Bickford Direct Motor Driven Drill, single spindle.**
Allen Sensitive Drill, four spindle.
No. 11 Natco Multiple Drill, 16 spindle.
★ **No. 3 Baush Multiple Drill, 20 spindle, No. 2 Morse taper, rectangular head 20" x 40".**

### GEAR CUTTERS

★ **No. 7, 71A, 715A Fellows Gear Shapers, all manufactured in 1936, with spur or helical guides, motor driven.**
No. 6 Fellows Gear Shaper, m.d.
★ **96" Gleason Spur & Bevel Gear Planer.**
No. 12 Barber Colman Gear Hobber.
No. 5-60" Brown & Sharpe Automatic Gear Cutter.

### GRINDERS

★ **15" x 15" x 96" Norton Surface Grinder, m.d.**
No. 16-26" and No. 16-30" Blanchard Surface Grinder.
★ **No. 214-30" Besly Disc Grinder.**
No. 72A3 Heald Gagematic Internal Grinder.
No. 70 and 75 Heald Internal Grinders.
No. 13 Brown & Sharpe Universal & Tool Grinder.
★ **14" x 120" Landis Cylindrical Grinder, hydraulic table feed, new in 1942.**
10" x 36" "Hill-Clarke" Norton Cylindrical Grinder.

### LATHES, ENGINES

8" Rivett Precision Screw Cutting, with turret attachment.
★ **30" x 14' LeBlonde Heavy Duty, c.d.**
24" x 30' Lodge & Shipley, g.h.
20" x 8' Lodge & Shipley, c.d.
★ **18" x 8' American, 8 speed geared head.**
16" x 6' Pratt & Whitney, c.d., with relieving attachment.
★ **8" x 60" Fitchburg Lo-Swing, g.h.**

### LATHES, TURRET

★ **No. 4L Gisholt, 9¼" spindle, chucking.**
No. 1A, 2A, 3A, Warner & Swasey.
2¼" x 24" Jones & Lamson, chucking, serial 40269.
★ **No. 6D Potter & Johnston Automatic Chucking and Turning Machine.**
No. 5A and No. 6A Potter & Johnston.
No. 2 Warner & Swasey, 12 speed, g.h.
No. 2, 4, 6, Warner & Swasey, c.d.
★ **42" Bullard VTL, New Era type.**

### MILLS

★ **No. 3B Milwaukee Universal, double overarm, m.d.**
No. 4 LeBlonde Plain, c.d.
★ **No. 2 Milwaukee Plain, double overarm, motor in base.**
No. 1A Milwaukee Plain, s.p.d.
★ **No. MM5 U. S. Multimiller, motor in base.**
18" Cincinnati Plain Mfg., s.p.d.
39" x 36" x 16' Ingersoll Rail Type.
★ **No. 4 Cincinnati Vertical, s.p.d.**
No. 2 Milwaukee Vertical, motor in base.
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4" Pratt & Whitney Spline Mill.

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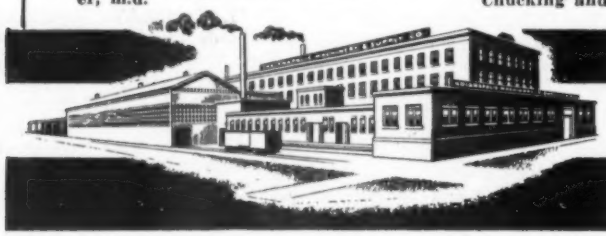
36" x 36" x 12' Woodward & Powell Planer, 2 heads.
24" x 24" x 8' American Planer, one head.
★ **6" Pratt & Whitney Vertical Shaper.**
4" Stevens Vertical Slotter, m.d.

### SAWS

★ **No. 6 Marvel Hack Saw, cabinet base with tank.**



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*MEXICO OFFICE: Balderas No. 31, Desp. 102, MEXICO, D. F.*

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**AUTOMATICS,** Acme 9/16" & 1" Mod. C 5 spdle.
**AUTOMATICS,** Acme 2" Model B 4 spdle., M.D.
**AUTOMATICS,** Gridley, 9/16", ⅞ & 1¼" Mod. G
**AUTOMATICS,** Cone, 1¼, 2½ & 3½" 4 spdle
**AUTOMATIC,** 1¼—8 spindle, M.D.
**AUTOMATICS,** Gridley, ⅝, 1¼, 1⅝, 2¼" & 2⅝" Model F, M.D.
**AUTOMATICS,** Gridley, 2¾, 3¼, & 5¼" S. S.
**AUTOMATICS,** Cleveland 1¼, 1½, 2, 2½, 3½ & 4¾" Model A, M.D.
**AUTOMATICS,** Cleveland, ⅞, 1¼, & 2" Mod. B
**AUTOMATICS,** New Britain #22 and 24 Chuckers
**AUTOMATICS,** Cleveland 3½" 4 spdle, Model K4
**AUTOMATICS,** Potter & Johnson #5a & 6a, M.D.
**BORING MILLS,** 30" Bullard, M.D.
**BORING MILLS,** Rockford, 3½" bar, Horizontal, 24x72" table, M.D. & 3½" Universal, M.D.
**DRILLS,** High Speed, B. B. 1 to 6 spindles
**GEAR HOBBERS,** 12 Barber-Colman, M.D.
**GEAR SHAPERS,** #7 High Speed, M.D. & #6
**GENERATOR,** Gleason Spiral Bevel Gear, 10"
**GRINDERS,** Brown & Sharpe #2 & 3 Universal
**GRINDER,** Brown & Sharpe #11 Plain, M.D.
**GRINDER,** Heald #72 Hydraulic, 2 M.D.
**GRINDERS,** Bryant #3, 6 & 18 Internal, M.D.
**GRINDERS,** Diamond Surface #2, M.D.
**GRINDERS,** Landis Hydraulic, 6x18" M.D.
**GRINDERS,** Pratt & Whitney, 12" Vertical Surface, M.D., 9x31", Magnetic Chuck
**LATHES,** Hendey, 16"x6' & 8' & 18"x10'
**LATHES,** Lodge & S, 20"x10' Geared Head, M.D.
**MILLING MACHINES,** #2 B Hvy. B&S Plain
**MILLING MACHINES,** Becker Vertical #5 & 6
**MILLING MACHINE,** Milwaukee #1B Plain & Universal #3B Plain, M.D.
**MILLING MACHINES,** #2 B Rockford Universal
**PLANER,** Gray 30"x30"x3' 2 Rail Heads
**PLANER,** Ohio 42"x42"x12' One Head, M.D.
**PLANER-SHAPER,** 30" Cincinnati, M.D.
**THREAD ROLLER,** ⅝" National Hydraulic, M.D.

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**8" x 48" Jones & Lamson Automatic Thread Grinder, 1940**
**#5 J&L Ram Type Universal Turret Lathe, 1940**
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**#5 Bardons & Oliver Universal Turret Lathe, bar & chucking, 1942**
**#2-S Van Norman Plain Milling Machine, 1942.**

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KEYSEATER—MITTS & MERRILL No. 6, MD.
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**LATHES**
7" to 98" swing.
Niles, Lodge & Shipley, American, Monarch, LeBlond, etc.

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⅝" to 6" capacity
Acme, Bardons & Oliver, Warner & Swasey, Foster, Jones & Lamson, etc.

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3", 4", 5" Universal, Giddings & Lewis
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16" to 36"
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#1 to #5 Plain, Universal, Vertical, 4 Heads Planer Type, Production.
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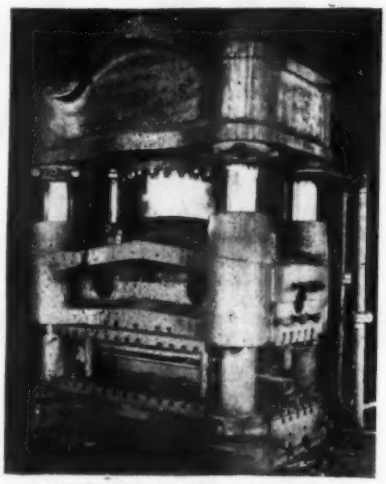

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24" x 24" x 6' to 72" x 72" x 26'
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New #510 Campbell Abrasive Cutters—10" x 12'
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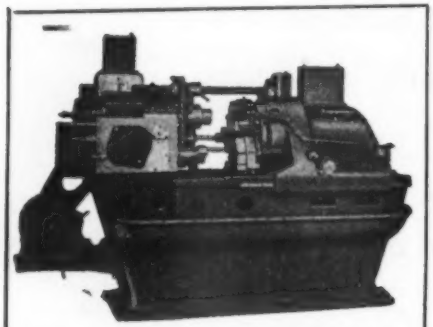

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Capacity 8½" in diameter x 8" long 5 chucks on turret

Maximum opening between chuck jaws 9⅝"

Minimum opening between chuck jaws 7⅝"

Maximum distance spindle nose to face of turret 23¾"

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Arranged for Motor Drive, without motor
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2—16x8 Hendey Geared head lathes

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1B—Kearney & Trecker, double overarm, M.D.
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No. 2M Cincinnati Vertical Mill, motor in base.
Mattison 12" x 16" x 48" Hydraulic Surface Grinder.

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THOMPSON 12" wide, 60" table; surface
THOMPSON Type F—6" Wide, 18" table; surface
BROWN & SHARPE No. 3 Universal

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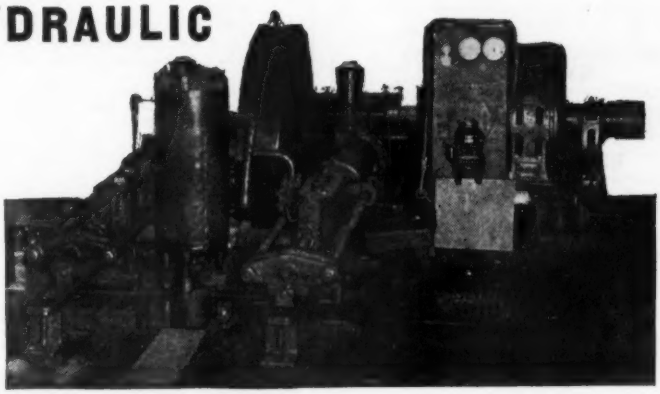

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8" Gleason Mfg. Type Straight Bevel, m.d.
11" Gleason Straight Bevel, m.d.
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9" Pratt & Whitney Hydraulic Spur Gear Grinder, m.d.
10" Pratt & Whitney Spur & Spiral Hydraulic Gear Grinders, m.d.
No. 3-26", 3-36", 4-36", 6-60" Brown & Sharpe Spur Gear Cutters
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Cincinnati Gear Burnisher, m.d.
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Cincinnati Valve Seat Grinder, m.d., cap. ⅜" valve stems

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No. 55 Heald, m.d.
No. 55 Heald, belt
No. 60 Heald, belt
No. 65 Heald, belt

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10x48" Landis Type C Plain Hydraulic, m.d.
10x72" Landis Plain Self-Contained, m.d.
12x36" Cincinnati Plain, belt
12x36" Modern, belt
12x48" Cincinnati Plain Self-Contained, m.d.
12x48" Modern Plain, m.d.
12x72" Brown & Sharpe Plain, belt
12x96" Landis Plain Self-Contained
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16"x68" Landis, belt

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No. 20 Gardner Comb, B.B. Disc Grinder and Roll Sander, m.d.
No. 4 Gardner, m.d.

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No. 16-16" Bryant, m.d., latest type
No. 16RS-16 Bryant, m.d., latest type
No. 16-22" Bryant, m.d., latest type
No. 6, 10, and 20 Bryant, belt
No. 24-20" Bryant, m.d., late
No. 72A3 Heald Sizematic, m.d.
No. 72A3 Heald Gagematic, m.d.

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14" Pratt & Whitney Vertical, ball bearing, m.d.
22" Pratt & Whitney Type B, m.d., late type
38"x38"x12' Gray Planer Type, m.d.
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No. 33 Abrasive Vertical, m.d. in base
54" Bridgeport Knife, belt
Baldwin-Tuthill Knife, 76"
Builders Iron Fdry. Co., m.d.

### TOOL & CUTTER GRINDERS

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No. 2 Cincinnati Universal Tool & Cutter, m.d.
Gisholt Universal Tool, belt
Gleason Cutter, belt
Gould & Eberhardt Gear Cutter, belt

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AUTOMATICS: (2) Gridley Single Sp. 3¼", 4¼" Cap.
(2) Davenports 5 Sp. 9/16" Cap. Model No. 24s
Br. & Sh. No. 4 (1½") Hi Speed
Vert. Bullard Mult-au-matic D, 6 Sp. 12" Cap. 1941
BORING MILLS: Hor., Gisholt 4"
Bullard V.T.L. 36" (1941) Hi-Speed
Bullard V.T.L. 24" (1940) Hi-Speed
DRILLS: (2) Avey #2, 1 & 2 Spindle, 12" overhang 1940
#3 Leland Gifford, 1 Spindle 4 speed mot (1941)
GEAR GENERATOR: 18" Gleason, Str. & bevel, segments
GRINDER: Thread, Excello No. 31 (1941)
Thread, J & L 8" x 48" (1941) & 6" x 15"
Double End, Norton, Model D
Rotary Surf, Blanchard No. 18 Chuck 30" (1941)
B. & S. No. 2 Univ. Cylindrical 14" x 30" (1941)
Chucking, Bryant No. 16, like new (1943)
Cevel Model No. 91A Un. Tool & Cutter (1944)
Int. Heald 72A3 Sizematic (1941)
Landis Crankshaft 16" x 48"
Plain Cyl. Landis 4" x 12" Hyd. (1943)
Surface Abrasive #3B (1941)
Vertical Surface Abrasive #33 (1935)
Pl. Cyl. Norton Type C Hyd. 10" x 18" (1940)
Univ. Cyl. Br. & Sh. #2, 14 x 30" (1941)
Int. Bryant #16 x 28", Two- (1940) (1943)
LATHES: Adams Short Cut Geared Head 14" x 4' Speed, Slean & Chase, collets, Bench type.
Lodge & Shipley 16" x 6', Quick Change, Taper (1941)
Engine, Lodge & Shipley Sel. g.h. 30"x12' mot.
Stub, Sundstrand, Auto 8" x 15", Type D (1941)
Lodge & Shipley 16"/20" x 30" Cent., Turret Att. (1941)
Monarch 16" x 30" Keller Attach. (1941)
Monarch 12" x 30" raised to 18" Swing (1941) dble compound
(2) Regal LeBlond 19" x 8' (1943)
MILLERS: Milwaukee #2 Universal Q.C.
Plain Horiz. No. 3 LeBlond, Vert. Att.
Plain, Garvin No. 14 (like No. 2)
Univer. Van Norman #2SU
Plain, Garvin #12 (Like #1)
Hand Garvin
Vert. Cinc. #3M.S. plus 20" Rotary Table (1941)
Vert. Milwaukee #3K plus 20" Rot. Table (1941)
Duplex Automatic Sundstrand 24" Index Table & station Rigidmill (1941)
Vert. Cinc. #2 with 16" rotary table constant
PIPE: Cut-Off-3" Hurlbert-Rogers
Portable Threader & Cut-off 2" cap.
POWER PRESSES: Perkins Jr. Special Hopper feed
Bliss #62 St. Side 6½" Str. 50 ton
PROFILER: Morey 2 Spindles (1943)
PLANER: Cinc. 36" x 36" x 10', 2 hds. rail. mot.
RADIAL DRILLS: Cinc. Bickford 2½' x 7½" Rd. Col. (1941)
Sterling Drillmaster #18 mot. (1944)
RIVETER: Counter Sinker Farnham, hyd. (1944) 36" Reach.
SAWS: Band, Kalamazoo, Metal (NEW) 8" x 16"
SLOTTER: Vert. Bement Niles 12"
SHAPERS: Stockbridge 24" b.g. mot. H.D.
G. & Eb. 24" H.D. mot.
SQ. SHEAR: Power Geo. Ohle 50" x ¼" cap. mot.
SHEAR: Pels T36 eye beam 4" angles H.D.
SLOTTER: Vert. Bement Niles 12"
TAPPERS: (10) Horiz. Richert Shaffer ⅜" mot.
THREAD MILLERS: Plan-o-Mill 8" Int. Ext. x 31" long (1943)
TURRETS: J&L No. 5 (1941)
Simmons Micro-Speed 1¼" Cap. (1943)
Midland #5 Universal (1943)
W. & S. No. 2 Mot. in base (1941)
Gisholt No. 2L Mot. in base (1941)
W. & S. #4 Univ. 1940
WELDERS: Spot, Larkin (new) all sizes.

**Phones: TRiangle 5-5212-5237**

MDNA MEMBER

**KINGS COUNTY MACHINERY EXCHANGE**
394 Atlantic Avenue, Brooklyn 2, N. Y.

---

Grinder, Surface, Wilmarth & Morman—6" x 24"
Grinder, Tool & Cutter, B. & S. No. 13
Grinder, Tool & Cutter, Norton
Shaper, Gould & Eberhardt 16-Inch
Shaper, Rockford, 16-Inch
Shaper, Potter & Johnson, 24-Inch
Drill, Milwaukee, 21"
Drill, Sipp, 2 Spindle, H.S. 8-Inch Sensitive 9-Inch overhang.

LAKESHORE MACHINERY & SUPPLY CO.
400 W. Laketon Avenue Muskegon, Mich.

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**POWER PRESSES**
BLISS, TOLEDO, V & O, ETC.
REBUILT — GUARANTEED
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**JOSEPH HYMAN & SONS**
Tioga, Livingston and Almond Streets
Philadelphia, Pa.

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## LUCAS—Home of Reliable Rebuilding, Offers You the Following Machines:

### BROWN & SHARPE SCREW MACHINES

1—No. 00 Full Automatic, Cullman Drive, Burring Attachment
1—No. 00 Full Automatic, Cullman Drive, Vertical Slide, Slotting Attachment
1—No. 2 Full Automatic, Cullman Drive, Slotter
1—No. 2G Full Automatic, Motor Drive, Slotting Attachment
1—No. 2G Full Automatic, Motor Driven, Vertical slide, Motor Driven Slotting Attachment

### WARNER & SWASEY TURRET LATHES

6—No. 4 Six-Speed Geared Head Universal, Timken Bearing Spindle
7—No. 4 6-speed Geared Head, Timken Bearings
1—No. 1A Hollow Hexagon Universal Turret Lathe, Motor Driven, Timken Bearing
2—No. 2A Hollow Hexagon Universal Turret Lathe Motor Driven

### CLEVELAND AUTOMATIC SCREW MACHINES

7—1¼" Model A Single Spindle, Cullman Drive
3—1⅜" Model AA Single Spindle, Motor Driven
1—2" Model A Single Spindle, Cullman Drive
4—2½" Model A Single Spindle, Cullman Drive
5—3¼" Model A Single Spindle, Motor Driven
2—4½" Model A Single Spindle. Cullman Drive
5—5½" Model A Single Spindle, M.D.
1—6¾" Model A Single Spindle, M.D.
1—7¾" Model A Single Spindle, M.D.

**J. L. LUCAS & SON, INC.**
**BRIDGEPORT 5 CONNECTICUT**

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## LATE TYPE MACHINES
***Ready for Action***

### MILLERS

1—#4B Brown & Sharpe Plain, hvy., all geared, arr. M.D.
1—#2M Potter & Johnson, M.D.
1—#2K Milwaukee Vertical, latest type.
1—Cincinnati 24" Duplex, #50 taper, arr. M.D., excel. cond., late type.

### LATHES

2—Pratt & Whitney 14"x6', SQCG, T.A.
1—Prentice Bros. 24"x18', Geared Head, arr. M.D.
1—Blaisdell 24"x10', L.C.G., T.A.
1—Jones & Lamson 2¼"x24" Turret Lathe, steel head, bar feed, tooling, ser. over 41,000 (1936).
1—Foster No. 4 Turret Lathe, 1½" cap., wire feed, collets, p.f. to turret.
2—Hendey Geared Head, arr. M.D.

### GRINDERS

1—Norton Cam Grinder, M.D., late type.
1—18" Ball Bearing Dble. End Disc Grinder with adj. tables, 5 hp. 3/60/220 (new 1943).

### MISCELLANEOUS

6—Baird #1 Tumbling Barrels, B.D., latest type.
2—Walker-Turret Bench Drills, M.D.
4—Buffalo Bench Drills, M.D.
1—Peerless Shaping Saw, 6x6, arr. for M.D.
1—Lucas 50 Ton Forcing Press, arr. M.D.
2—Kalamazoo Saws, 8x16 (new).
1—Ammco 7" Shaper on Bench, M.D. (new).
1—24" Gould & Eberhardt Shaper, single pulley dr.
1—Oilgear Hydraulic Shaft Straightener.

**UNITED MACHINERY & TOOL CORPORATION**
**34 Hermon St., Worcester 8, Mass.**

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## New "SEARCHLIGHT" Advertisements

received by 10 A. M. October 10th will appear in the October 25th issue subject to limitation of space available. Address copy to the

**Departmental Staff**
**AMERICAN MACHINIST**
**330 W. 42nd St., New York 18, N. Y.**

## 1942 & '43 TOOLS
## IMMEDIATE DELIVERY

**No. 4 Cincinnati High Power Miller with Turchan follower or duplicating attachment.**

**No. 2 Cincinnati Medium Speed Dial Type vertical miller.**

**No. 2 Cincinnati Medium Speed Dial Type plain miller.**

**2½" capacity No. 7A Jones & Lamson saddle type turret lathe with lot of equipment.**

**14" Pratt & Whitney hydraulic feed vertical surface grinder with magnetic chuck.**

**12" Betts Heavy Duty crank slotter.**

**No. 5 Plan-O-Mill thread miller, hydraulic feed.**

### OTHER MODERN TOOLS

BROACH. Twin 10 Oilgear duplex hydraulic.

BROACH. No. 2S Lapointe hydraulic

BROACH. No. 1 Foote Burt vert. surf. hydr.

BUFFER. No. 40 Standard Elec. NEW.

DRILL. 21" Canedy Otto upright. NEW.

GEAR SHAPERS. Nos. 7 & Z1 Fellows

GEAR HOBBERS. Nos. 16HS & 18H G. & E.

GRINDER. 6"x18" Thompson hydr. surface

GRINDER. 12"x36" Grand Rapids hydr. surf.

GRINDER. 16", No. 10 Blanchard surface

GRINDER. No. 2 Cincinnati centerless

GRINDER. No. 2 Brown & Sharpe univ.

GRINDER. No. 72A3 Heald Sizematic Internal.

LATHE. 14"x18" Monarch Magnamatic

LATHE. 15"x22½" Sundstrand automatic stub.

MILLER. No. 1½ Standard Hand. NEW

MILLER. No. 2 Kent Owens Hand.

MILLER. Ingersoll rotary & planer type (11)

SHAPER. 32" Morton draw-cut, M.D.

**MILES MACHINERY CO.**
**SAGINAW MICH.**

## Ready For Shipment

### AUTOMATICS:

B & S #00, #0 #2
Gridley 3¼", 4¼" 1 sp.
Potter & Johnston #6C Chuckers
Gess & Delecuw Chucker
Cone 3½" Cap. 4 spindle
Cleveland 6¾" Model A

### BORING MILLS:

Cleveland 2½" Bar Horiz.
Bullard 30" Vert. Turret
Rogers 36" Like New
Bertram 42" Vertical
Bullard 100"—2 Head—M.D.

### DRILLS:

Allen, Henry & Wright
Avey, Leland-Gifford 1 to 6 spindle
N-B-P 5' & 6' & 7' Radial, Motor on Arm
Niles 7' Radial
Cincinnati-Bickford 6' Radial
Pratt & Whitney Gun Barrel Drills & Rifiers

### GEAR CUTTERS:

Barber-Colman #2 Gear Hobbers
Brown & Sharpe #3—26"
Fellows #64
Fellows Gear Burnisher
Gleason 11" Generator

### GRINDERS:

Cincinnati #2 & #3 Centerless
Baxter D. Whitney #23 Cylinder Grinder, Like New
Brown & Sharpe #11 Plain
Greeby Internal
Heald #70-A Internal
Blanchard #16-26" M.D.
Abrasive #3 Surface
Norton 15"x15"x72" Surface
Sav-Way Internal
Brown & Sharpe #13 Univ. & Tool
Brown & Sharpe #3 Univ.
Bath 10"x25" Univ.
Cincinnati 12"x36" Univ.
Landis 20"x120", 20"x144" Plain Grinders
Cincinnati #1½ Tool & Cutter
Pfauter Hob Grinder
Bryant #3B, 6, 12, 18 Internal
Cincinnati 12"x26" Plunge Cut

### LATHES:

Sidney 17"x8'
Ledge & Shipley 20"x8'—G.H.
J & L 2¼ x 24 & 3 x 36 Turret
B & O 3" Cap. G.H.
Warner & Swasey #2A & #3A.
Oster #60I—1½" Cap. Hand Screw
Brown & Sharpe #1 Hand Screw
Foster #1B & #7 Turret

### MILLERS:

Cincinnati #0-8 Plain
Sundstrand #1 & #3, New 1940
Milwaukee Simplex
Cincinnati #5 Plain SPD
LeBlond #3GH—Plain
Rice-Barton Spline Millers
Becker #4B Vertical
Cincinnati #3, #4 Vertical SPD
B&S #3 Vertical SPD
Becker Model C, Vert.
Waltham Bench Thread Miller
Rowbottom Cam Miller
P & W 5", 12" Automatic
Pratt & Whitney 2" Spline Duplex
Cincinnati 12" B.G. Mfg. Becker #7H Lincoln
Potter & Johnston #2M Prod.
P & W #2 Column

### MISCELLANEOUS:

Boring Machine—Coulter Diamond Borer
Chambering Machine—Pratt & Whitney
Chucking Machines—Potter & Johnston #6-C
Cut-Off Machine—Abrasive #213 Hydraulic
Header—W-F #1 & #2—SSSD
Shaper—P & W 6" Vertical
Shear—Marshalltown #88 Rotary Bevel, M.D.
Tapper—Threadnut #2
Threader—Manville #3 Auto. Duplex Bolt Thread Cutting machine, Hopper Feed, M.D.
Trimming Machines—V & O #202½
Upsetter—Acme 2" Steel

### PLANERS:

Cincinnati 48"x48"x20', 3 Head
Gray 84"x72"x18', 4 Head

### PRESSES:

Bliss #307-A

W-F 20 Ton Rack & Pinion
Robertson 170 Ton Hyd. 16' High

**BOTWINIK BROTHERS, INC.**
**373 Welton St., New Haven 9, Conn.**

# CLOSEOUTS

### Boring MILLS
#### HORIZONTAL

2½", 4" Binsee
4" Landis Horiz., Floor Type, M.D.

#### VERTICAL

66", 120" Niles
54" Colburn, M.D., 2 hds.

### TURRET LATHES

Foster Nos. 4, 5, 6, 1B, M.D. Univ.
J. & L. 2¼x24", 3¼x36"
Acme 3¼" M.D.

### GRINDERS

P. & W. 14", 18", B.B., Vert., M.D.
Blanchard 30", M.D.; Modern 12x48", MD.
Norton Hydraulic 12x18", M.D.
Heald Nos. 55, 70, 72A3 Gagematic, M.D.
Norton 50"x28', M.D.
Landis Type A 6x20" Hydraulic, M.D.
Bryant No. 12, M.D.
Nos. 50, 55, 60 Heald Int. Hydraulic, M.D.
12" Heald Rotary, Arter 15" M.D.
B. & S. No. 2 Surface, M.D.
Norton 10x36" Hydraulic, M.D.
Badger 24" Dble Opposed, M.D.
B. & S. No 10, 1' Cyl.
No. 2 Cincinnati, Centerless, M. D.
B. & S. No. 1, 3 Universal

### LATHES

McCabe 26-42"x14'
24x12' Boye & Emmes 8 step cone, B.D.G.
20"x14' Rahn-Larmon, raised to 24"
14x6' Hendey
9" LeBlond Automatic
36x30' Putnam, M.D.
36x22' Putnam S.C.G., D.C.M.D.
32"x35' Wickes
Putnam 42x16', M.D.
30x26' L. & S. 12 speed M.D.
P. & W. 1x18, 1¼x18 Automatic Lathes

### AUTOMATICS

B. & S. No. 2, 6, 6F Hand Screw
B. & S. No. 00, 0
5 Spdle. Davenport 9/16" cap.
Cleveland Model A ½", ⅝", 1¼", 2"
Cleveland Model B 1", 2"
P & J. 6A, M.D.
⅞" Cone 4 spindle

### *New In Stock*

5, 10, 20 ton OBI Power Presses
7" Ammco Shapers
Halco Vertical Heads Drill Presses
Kalamazoo Metal Band Saw

### RADIALS

3', 4', 5', 6', 8' American Triple Purpose
3', 3½', 4', 5' Cincinnati-Bickford
4' Mueller. M.D.; 4', 5' Western, S.P.D.

### MILLING MACHINES

10" P. & W. Auto.
No. 3S Cincinnati, S.P.D. rapid trav., M.D.
Nos. 1Y, 0Y, 3, 4, 5 B & S Plain & Univ.
B. & S. Nos. 12, 13, 13B
Hall Planetary Model D Thread Miller
Providence Planer Type 32"x8'
Becker Nos. 3, AB, 5, 6 Vert.
Nos. 3, 4, Cincinnati Vert.
P. & W. No. 12, 30 Profiler, M.D.
No. 4 B. & S. Universal
K. & T., B. & S. No. 2, 3 Dbl. overarm
B. & S. No. 2, 3, Vert
Milwaukee No. 2½ B Vert.
Kempsmith No. 1 Univ.

### MISCELLANEOUS

Gorton No. 1S Engraving Machine
6 spindle Avey Drill, 15" overhang
McCabe ½" Flanger
Rochester No. 5½ B Hammer
Baker #2 Keyseater 6 P.D.
Pels 6" Vert. Shaper
Pipe Machines, 4", 6", 8", M.D.
N.B.P. 15" Slotter, M.D.
#7 Burr Keyseater
Natco No. 13 Multiple Spindle Drill
48" Southwark gate shear ½" 24" gap.
6' Hilles & Jones Roll

**AARON MACHINERY CO.**

MDNA MEMBER

**45 Crosby St.**
**New York 12, N. Y.**

**To meet competitive production, draw upon Botwinik's immense stock for your machine tool needs, and upon its rebuilding facilities to restore your present machines to profitable operation.**

***Write for complete CATALOG.***

***Here is a battery of 20 outstanding motorized Brown & Sharpe Machines.***

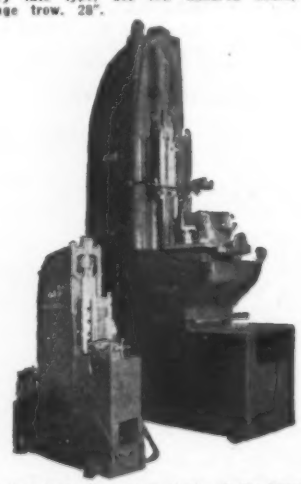
Brown & Sharpe 00G Full Auto. Screw Machines, M.D., constant speed drive, capac. 5/16", turns any lgth. to 1¼", feeds any lgth. to 2", complete with stock stands, comp. with AC motors and controls, excellent condition. Ser. Nos. 9315, 9189, 9313, 9169, 9323, 9150, 9314, 9305, 9170, 9171, 9151, 9307, 9149, Brown & Sharpe 0G Full Auto. Screw. Machines, Constant speed drive capac. ½", turns any lgth. to 2", feeds any lgth. to 3", complete with stock stands, M.D. with 3 hp. AC motor and controls, same machines with slotting attmts. Ser. Nos. 5637, 5451, 5450, 5636, 5449, 5638, 5639.

4—Leland-Gif. No. 1 LMS bench type, sin. spin. M.D. Drills, Serial Nos., 2349, 2353, 2354, 2359, No. 2 Morse Taper, spin. speeds 600-8000 RPM., late type, used only slightly.

1—Leland-Gif. 2 LMS. Floor Type sin. spin. M.D. Drill., Ser. No. 6691, with hyd. power feed, No. 2 Morse Taper, spin. speeds 150-3600 RPM Very late type, used only few hours.

1—Leland-Gif. No. 2 Sin. Spin. M.D. Drill, No. 2 Morse Taper, spin. speeds 600-1800. (These machines equal to brand new. Very latest type)

1—Landis 1½"-4" sin. hed. lead screw type Bolt Threader, M.D. ser. no. 48L07, comp. with stan. rotary die hed., auto opening and closing for die hed., lead screw, M.D. three silent chain drive, 71 hp. AC motor and controls, very late type, use few hundred hours, carriage trow. 28".



Cin. No. 2-36 Sin. Ram Vert. Hydro-Broaching Machine, M.D. Serial No. 1EOZ-1H-3336496, very late type, max. strike of ram 36", tbl. wkg. surf. 13" x 19¾", broach force exerted 5000 lbs., complete with AC elect. equip., used but a few hundred hours.

**Botwinik Brothers**
*of Mass. Inc.*
3 SHERMAN ST., WORCESTER 1, MASS.

# PRACTICALLY NEW

## *VERY SLIGHTLY USED*

1—#3 BARDONS & OLIVER UNIVERSAL TURRET LATHE with bar equipment

1—SIMMONS 1¼" Capacity HAND SCREW MACHINE

1—ABRASIVE MACHINE COMPANY HAND SURFACE GRINDER. Less than 3 months old.

1—#12M MOREY PROFILING MACHINE, motor driven.

1—17" DELTA 4-SPINDLE DRILL with power feed attachment.

**REYNOLDS MACHINERY CO.**

**210 Eddy Street**

**Providence 3 Rhode Island**

6' American Plain Radial Drill, M.D.
#3 Cincinnati Vertical Milling Machine H.P.
38"-44" Niles-Bement-Pond Vertical Boring Mill M.D.

### HEAVY DUTY MACHINE TOOLS

52" Bullard Vertical Boring & Turning Mill.
6' Cincinnati Bickford Plain Radial Drill.
7' Cincinnati Bickford Plain Radial Drill.
7' American Triple Purpose, Motor on arm.
27"x16' Lodge & Shipley Grd. Hd. Tapers.
30"x14' Schumacher & Boye Lathe, Q.C.
10' Cincinnati Heavy Duty Boring Mill, M.D.
12' Niles-Bement-Pond Heavy Duty Boring Mill, M.D.

### GRINDERS

12"x96" Landis Plain, S.C.
18"x85" Landis Plain Self contained.
#78 Covel Hanchett Surface.

### GEAR MACHINERY

18" Gleason Bevel Gear Generators.
6" Bilgram Bevel Gear Generator.
#1 Adams Gear Hobbers.
#1 Schuchart & Schutte Gear Hobber.
#3 Adams Farwell Gear Hobber.
#61 Fellows Gear Shaper, Cone drive.

### PLANERS

96"x96"x36' Cincinnati 4 Hds. M.D.
48"x60"x26' American 4 Heads.
30"x30"x8' Gray Planer.

**CINCINNATI MACHINERY & SUPPLY CO.**

**217 East Second St., Cincinnati, Ohio**

## LATEST TYPE MILLING MACHINES For Sale

***Following equipment purchased new during the last five years:***

2—Sundstrand #0 Hydraulic Millers, meters, arbor support, complete automatic spindle stop and solenoid brake, coolant system 6" x 1" x 40 degree arbor, 1 open and wrench, 1 head crank.

4—Kent Owens Hydraulic Miller Model 1-8 with coolant pump, Hydraulic motor pump, spindle motor, hex wrench, operating handle etc.

1—#33 Simplex Stokerunit Milling Machine, with coolant system—motors, arbors, 2 arbor supports, 8 gear speeds.

9—U. S. Multi-Miller Model 1-60 with overarms, motors, pulleys, draw bars, 2 V-Belts with ¼ HP Motor for table drive, electrical controls, coolant pumps and lubrication system.

6—U. S. Multi-Miller Model 1-52 with overarm, motors, pulleys, draw bars, 2 V-Belts with ¼ HP motor for table drive, electrical controls, coolant pump and lubrication system. One of these has micro stop attached.

5—U. S. Multi-Millers Model 1-4 with overarms, motors, pulleys, draw bars, 2 V-Belts with ¼ HP motor for table drive, electrical controls, coolant pump, automatic lubrication system.

**SYRACUSE SURPLUS CO., INC.**

**107 W. Hiawatha Boulevard**

**Syracuse 8, New York**

Telephone 3-0151

Boring Mills, 36"-42"-52"-72"-96".
Bolt Cutters 1"-1½"-2"-2½" Acme-Landis
Lathes, 20" to 30" Geared Head, M.D.
Press, Forging 1000 Ton United, St.-Hyd.
Planer, 36"x36"x12' Powell 4 Hds.
Planer, O. S. 60"x60"x14' D. & H., M.D.
Profiler, #13 P. & W., B.D.
Shapers, 10"-20"-24"-36".
Shaper, 36" Morton, Draw Cut

**West Penn Machinery Company**

1210 House Bldg. Pittsburgh, Pa.

***Just Purchased!***

**2—300 K.W. BURKE 3 WIRE DIRECT CURRENT SYNCHRONOUS MOTOR GENERATOR SETS**

### SPECIFICATIONS:

Generator: 300 KW—Type CB67, 900 RPM 1200 amperes, compound interpole, aerial Nos. 136014 and 136129

Motor: Synchronous 450 H.P.—Type AC88, 3 phase, 60 cycle, 4150 volts, (2300 & 550 volt) .85 P.F., serial Nos. 136010 and 136011

Equipment: D.C. Panel Board and Reduced Voltage A.C. Starting Panel

Late Modern Equipment—Like New—Could be inspected while in operation.
Location: Cleveland, Ohio

**L. J. LAND AND COMPANY**

Established 1910

**146 Grand St. New York 13, N. Y.**

Phone: CAnal 6-6976

NEW—USED **MACHINERY** and EQUIPMENT

LARGE STOCK ON HAND

*Hasco* MACHINERY COMPANY

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NEWARK 5, N. J. BIGELOW 3-3486-78

**PIPE** New & Reconditioned

**ALL SIZES for ALL PURPOSES**
Cut and Threaded to Your Specifications
**VALVES AND FITTINGS**

**UNITED PIPE & SUPPLY CO.** Department 105 NORRISTOWN, PA.

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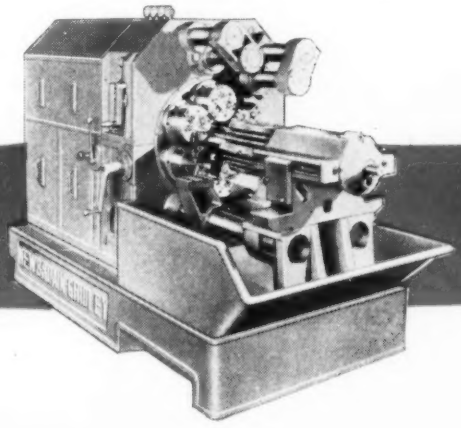

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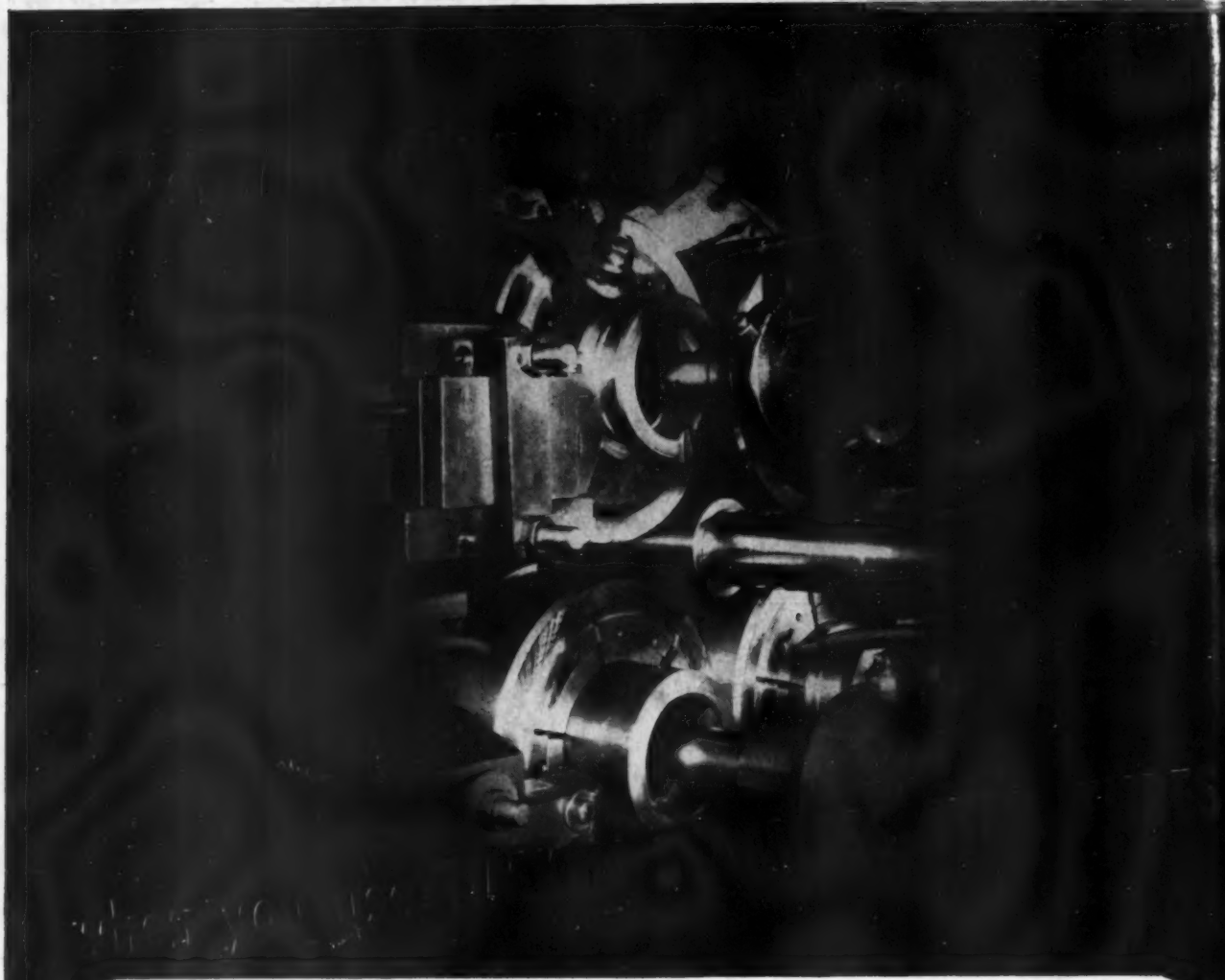

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